The Canadian
Medical Association Journal

Vol. XXIV TORONTO, FEBRUARY, 1931 No. 2

A Clinical Address

ON

REST, WORK, AND PLAY IN HEALTH AND DISEASE*

BY SIR E. FARQUHAR BUZZARD, BT., K.C.V.O., M.D., F.R.C.P

Regius Professor of Medicine, Oxford University.

WHEN our President honoured me with an invitation to address you to-day, I did my best to visualize the conditions under which I should have to carry out my task, and came to the conclusion that work and play would be appropriate subjects for discussion at this meeting, and that rest on this, the last day, would not be without its seductive appeal to some of us. Questions in regard to indulgence in work, play, and rest are so often put before us in our professional capacity, and are so often answered with more respect to tradition than to experience, that they deserve the reconsideration due to all possible factors in the production or maintenance of health and disease. While it is true that play and rest are generally, and indeed not unpopularly, recognized as prophylactic and remedial agents of no mean value, the position of work is more precarious in the minds of the profession and of the public, and it may be that it has earned a reputation for etiological mischief based on somewhat slender evidence. It is not surprising—it is only in accord with human nature—that when the cause of an illness is in doubt, over-indulgence in work is a more acceptable verdict than over-indulgence in other things, such as food, drink, or tobacco. But a verdict which is most welcome is not always the best founded, and the medical profession, bearing in mind the well-recognized good health and longevity of its members, should surely hesitate to agree that over-working can be held responsible for disease or death, without a careful examination of the testimony supporting that doctrine.

It might at first sight be presumed that our knowledge of the physiology of the nervous system provides us with principles sufficiently reliable to guide us in prescribing work, rest, or play; but, helpful as such knowledge is, it is not yet equal to solving all the problems with which we are confronted, and we must still look to clinical experience for light and learning.

On the other hand, clinical experience is of little value unless it is subjected at every step to careful analysis and the *post hoc propter hoc* process of reasoning used with critical economy. If this rule were as conscientiously observed as it should be by all who have had the advantage of a scientific training, the value of time, the lapse of time, as an important ingredient of treatment, would not be so often overlooked. And giving credit to time is, after all, only an alternative to paying the tribute due to nature's share in repairing structure and restoring function. This sounds like a platitude when addressed to those who have wrestled successfully with the courses and inquisitions of the medical curriculum; but if the critical faculty inculcated by the latter survived more generally for a few years the ordeals of practice, we should dispense with at least one-half of the therapeutic measures and concoctions which are prescribed from time to time at the dictates of a prevailing fashion or of an enterprising firm. Is it not true to say that while the time factor is usually estimated at its proper value in relation to certain morbid conditions, the length of which is more or less defined, such

*Delivered on the occasion of the combined meetings of the British and Canadian Medical Associations, Winnipeg, Aug. 29th, 1930.

as a specific fever or a bony fracture, it is undeservedly neglected in relation to other common disorders whose course is less easily foretold, such as an attack of sciatica or a broken heart? I need only remind you of the craze for rest cures as the universal remedy for all psychoneuroses thirty years ago in order to illustrate the dominating influence of fashion on medical practice. The employment of rest in the treatment of an anxiety neurosis, as in the treatment of a damaged joint, has indeed undergone a revolutionary revision in recent years. My chief object to-day is to examine our established practice in regard to the prescription of work, rest, and play, and to question some of the principles which govern it. As the nervous system is more concerned with these matters than any other, my illustrations will be largely drawn from its functional and organic disorders, and particularly from those which call for specific advice in the regulation of mental and physical activity.

THE PRESCRIBING OF WORK

Epilepsy is one of the commonest disorders of the nervous system, and one which every practitioner is called upon to treat. I expect that we shall all agree that the following story is typical of many presented to us. A boy of 14 years of age, with a nervous history, of average good health, and with apparently good prospects, has a fit, followed a few months later by another. Perhaps the first has been disregarded, or attributed to some quite inadequate cause, but the second has created alarm, and awakened the parents' minds to the possibility that their son's whole future career is jeopardized. In this atmosphere of panic it is not unnatural, and certainly not unusual, to find that some drastic alteration in the patient's life is advocated. He is to be taken away from school, his brain must be freed from all the strain of lessons, and he is to be allowed to run wild for a year in the open air. The chief advantage of such advice is that it sounds eminently sensible, and yet experience teaches us that it may have disastrous results from more than one point of view. In the first place, there is no justification for believing that it will diminish the liability to recurrent attacks; in the second place, it interferes with and interrupts the normal progress of intellectual and moral development and discipline; and thirdly, it suggests to the patient's mind that he is not as other boys are, with the result that a sense of inferiority is easily acquired. Even these disadvantages might be worth incurring if we did not know that, speaking generally, an epileptic subject is less liable to fits when his attention and interest are fully occupied than when his thoughts are allowed to run loose. I have known so many children of both sexes overcome the liability to fits when their ordinary educational career is proceeded with that I am convinced that work can rarely exercise any prejudicial effect. In other words, regular and moderate hours of work and play may safely be regarded as an essential part of the treatment, and if, when combined with medicinal therapy, they are unsuccessful, the outlook is certainly grave. Perhaps a general recognition of this truth might influence more schoolmasters to co-operate in rescuing boys and girls from the menace of a very terrible affliction. Undoubtedly, not a few regard the epileptic brain as an organ which should not be allowed to exercise its normal functions, an opinion to which I can give no support. Our ignorance of the pathology of the epileptic habit is so profound that we are obliged to seek elsewhere for guidance in preventing its establishment, and I feel convinced that much depends, in a great many cases, on the way the patient is handled when the first symptoms of this nervous disorder make their appearance. While it is one of the few diseases in which the influence of drugs, properly administered, is of paramount importance, success in treatment is enormously favoured by interfering as little as possible with the normal routine of cerebral activity—in other words, with the ordinary ration of work.

Let me turn to another common disease of the nervous system, of which the pathogenesis is still not established. A young woman, between 20 and 30 years of age, engaged in teaching, develops diplopia and a disability of one limb, leading to a diagnosis of disseminated sclerosis. Vision returns to normal and the defective limb recovers its function in the course of a few months, but the diagnosis has been made, and the patient's relations know that a threat of recurrent disabilities overhangs the girl's future. The doctor is asked what steps can be taken to prevent relapses, and in many cases he will advise the relinquishment of her work and the avoidance of all mental and physical exertion. Again the advice sounds all right, but can it be justified by any reliable evidence? My clinical experience leads me to believe that we are without any

satisfactory knowledge as to what factors are responsible for the appearance of fresh plaques in this disease, that relapses may be delayed for five, ten, or fifteen years, and that they are as likely to appear at the end of a long restful holiday as in the middle of a strenuous term's work. If this is the case, are we justified in asking our patient to give up her career, her interest, and her chief source of happiness in life? I can recall so many patients who, in spite of carrying the label of disseminated sclerosis, have led active and useful lives over a number of years. that I should always hesitate to advocate one of idleness. I cannot believe that normal activity or even normal fatigure of the nervous system has any prejudicial influence in such cases, and I am sure that the patient's interests are best served by the encouragement to resume her normal occupation and habits. One particular incident which has always been fixed in my memory is worth recording in this connection. A young woman, who had suffered from symptoms of disseminated sclerosis and had temporarily recovered, was employed in a large shop or store. The building in which she worked caught fire. She escaped with difficulty, although several of her companions lost their lives. In spite of this emotional experience, followed by months of particularly hard work, she remained quite well, and it was not until a year or two later, while spending her summer holiday at the seaside, that she developed further symptoms of her disease. Before leaving the subject of disseminated sclerosis I must make it clear that I do not advocate activity during the acute phases of the disease. On the contrary, rest must be regarded as a first essential in favouring the complete or partial restoration of function in damaged parts of the nervous system, a process which may be safely entrusted to time and nature, at any rate in cases of recent origin.

Paralysis agitans, or Parkinson's disease, affords another example of organic disorder of the nervous system in the handling of which the question of work and rest has often to be answered. Here we have to deal with a chronic progressive defect of function of a part of the central nervous system, the cause of which is unknown and the course of which we are entirely unable to influence by any method of treatment. A man of 50 engaged in business, and blessed with other interests and hobbies, develops the characteristic facies and tremor of the disease, and quite naturally asks whether he should give up his work and lead a more restful and sedentary life. In my opinion the answer should be definitely and firmly in the negative. The devotion of time and money to the many curative treatments which will be pressed upon his notice can only lead to a long series of disappointments, and the more leisure he has at his disposal the more will he become preoccupied with his affliction. If he is well advised he will carry on with his work and his play regardless of the fact that he is slower and less active, and as far as possible refuse to recognize his limitations. Only by taking, and persevering in, such a line of action will his life be made tolerable, and we have no right to suggest that by sacrificing his work or his recreations he may expect to render his disabilities less irksome. There is nothing more pathetic or tragic in medicine than the sight of a patient suffering from paralysis agitans who has given up his lifelong interests in the vain pursuit of a cure, and it is difficult to exaggerate the importance of giving the right advice in these cases. There is nothing easier for the medical attendant to advocate than avoidance of mental and physical activity, the very attributes which it is most desirable his patient should foster and preserve.

The observations I have offered on epilepsy, disseminated sclerosis, and paralysis agitans may be applied with discriminating modifications to many other organic disorders of the nervous system. They uphold the principle that work, the normal activity of the nervous system, is not contraindicated even when parts of it are damaged or out of order, so long as the latter are not subjected to an unreasonable amount of strain. They are opposed to the tradition that because a patient is suffering from a disease of the nervous system all the multitudinous functions of the brain should be put in irons and allowed to rot. After all, we encourage other organs to carry out their functions even when they are damaged by disease. Work is a physiological, not a pathological, process, and its output is not only valuable in itself but carries with it a psychological influence of paramount importance to the patient's insight, his outlook on life, and his general welfare.

REST IN THERAPEUTICS

If discrimination is called for in prescribing work, it is equally necessary in prescribing rest, and a review of our practice in the latter and of the doctrines which have led up to it may not be

without profit. In the first instance, I propose to deal with rest as it is employed in the treatment of psychopathological conditions, and the word "rest" will, for the moment, mean confinement in bed with partial or complete isolation. May I remind you again of the fact that for a period of years rest cures were regarded as the orthodox method of treating neurasthenic and psychoneurotic disorders, and may I suggest that the practice has become less fashionable because experience has exposed its failure to deal effectively with all cases? It may be that rest cures still have their value, and it may be that we are still not quite competent to judge when complete rest in indicated or contraindicated. The rest cure prevailed at a time when our insight into so-called "functional disorders" was not so clear as it is now, and there can be little doubt that it was employed indiscriminately for a number of conditions which differed in origin and which therefore called for different treatment. Moreover, when it successfully attained its object, and relieved the patient, there was always some doubt as to the relative share of the prescribed rest, of suggestion, and of the lapse of time in achieving the result. The bulk of "functional disorders" can be divided for practical purposes into three categories: (1) the anxiety neurosis, (2) hysteria, and (3) the milder forms of the manic-depressive psychosis. Hysteria may be dismissed from further consideration here, because its treatment is essentially based on psychotherapy, and rarely demands serious rest. In fact, we may be assured that a rest cure unassociated with psychotherapy would be singularly unsuccessful in curing the frank hysteric.

In spite of our improving insight into psychopathological disorders, the differentiation of an anxiety neurosis from a mild manic-depressive psychosis is not always made with the sharpness it deserves, and in view of its importance for the purpose of treatment a short consideration of the problem will not be out of place. Certain symptoms are common to both conditions, and so lead to mistakes in diagnosis and to inappropriate treatment. Depression insomnia, failure of concentration, decision, and memory, exhaustibility and restlessness are complained of both by the neurotic and by the psychotic patient, and particular attention must be directed to one or two of these symptoms in order to make a diagnosis. The depression of the neurotic patient is variable and sometimes dispersible; it is made worse by fatigue and may be alleviated by distraction. It is attributed to the faults of others or to unfortunate circumstances, and it is very rarely of a quality or intensity which leads to suicide. The depression of the psychotic patient, on the other hand, is that of a person who is incapable of interest in anything. It involves loss of natural affections and appetites, and cannot be dissipated by distraction. It is associated with self-accusation and remorse for some real or imaginary wrongful act or behaviour in the past, and no arguments will avail to correct the obsession. It is at its worst in the early morning, when morbid and suicidal thoughts are apt to be translated into deeds. With the neurotic patient sleep in always a difficulty, and he is inclined to lay the blame for his sufferings on insomnia. With the psychotic patient sleeplessness is not so invariable, and indeed may sometimes be self-inflicted, owing to his dread of the terrible depression which overtakes him on waking. The one fears the night, the other the day. Further consideration of the distinctive characters of these two conditions would be out of place, and I have said enough to indicate the features concerned with the question of therapeutic rest. Harking back to the success and failure of the rest cure it is easy to realize that many a patient suffering from psychotic depression was well protected and cared for during the period of his illness, and that the necessities for his recovery —rest, encouragement, and time—were all available, if his pocket could stand the strain. We know that such patients always recover in time, that sympathetic care rather than active treatment conduces to safety, and that psychoanalytical attacks are more of a danger than a help. The patient with an anxiety neurosis is a different problem. Rest may or may not be helpful, depending on the state of exhaustion prevailing at the moment he comes under medical attention, but recovery will depend more on skilled psychotherapy than on the prescription of so many weeks' confinement to bed. In fact, we must never forget that rest tends to narrow and to limit the patient's environment, and so encourages preoccupation and introspection.

I have memories of the anxiety neurotic patient emerging from a prolonged rest cure unrelieved, and I can recall certain patients with psychotic depression being released too soon from allotted periods of rest, only to end their lives. The question of rest in the treatment of functional nervous disorders is not, therefore, so simple of solution as it at first appears. Its value can

only be estimated accurately in the light of a correct diagnosis. The rest cure has fallen into comparative disrepute now that we realize that rest is a useful ally, but rarely the essential agent, in the relief of the "psychopath." But a rest and a rest cure are not synonymous terms, and the former is loosely used to indicate relaxation and recreation as well as physical torpor. In this way rest from work may include recreation, which is often play, a species of activity the reverse of restfulness. In the maintenance of health there is much variation among individuals in regard to the amount of sleep or complete repose required in order to avoid undue fatigue. It would seem that every individual is endowed with his own capital of nervous energy on which to draw, and that over-expenditure is attended by symptoms with which we are all familiar. We also recognize that prolonged activity of one part of the nervous system may lead to fatigue of its particular function or reactions, without unduly depleting the capital of nervous energy or interfering with the function of other parts. It is on this principle that the healthy person, consciously or unconsciously, regulates his life; in other words, he employs various parts of his nervous system in turn without tiring out any one of them. Unwittingly he recognizes the physiological law that reactions are more easily fatigued than the common paths through which they are executed, and that one set of reactions may regain their functional integrity after fatigue, while others occupy the field of action. The repetition of one operation may in the end produce what is called specific objective fatigue, a form of fatigue which does not interfere with the performance of another operation. On the other hand, general objective fatigue which may be induced by one kind of work may affect the output of an entirely different kind of work to a small extent. Experiment has shown, however, that fatigue produced by mental work is evanescent, the mind being restored to efficiency by sleep or by short interruptions of its activity. The phenomena attributed to overwork are more often and more justly to be ascribed to preoccupations of a personal character amounting to an anxiety neurosis. According to Gillespie: "Clinical experience bears out these experimental findings. Mental exhaustion, brain strain from overwork, and the like can be safely discarded as a hypothesis in 999 out of 1,000 cases. The apparent mental incapacity in such cases is nearly always the result, not of intellectual effort, but of anxiety or a kindred emotional disturbance. This is brought home very dramatically in the sudden recovery of persons complaining of 'brain-fag,' which has perhaps limited their work to periods of less than an hour each, when a source of worry is removed."

Except during sleep, the mind is always active, and it is customary to allot a certain number of hours in each day to a specific form of work, mental or physical, the remainder being spent in recreation. The latter may be of various kinds, according to the interests of the individual; the pursuit of art, science, or literature, or participation in sport or games. They all involve cerebral activity, and derive their beneficial effects from the fact that the centre of interest and action is temporarily changed. The player of a game, for instance, is refreshed by following his favourite ball because his centre of interest is altered, other reactions are initiated, and his mind is preoccupied with problems entirely different from those associated with his work. It is probably not an exaggeration to say that these factors are of much greater importance than the physical exercise the game involves in promoting a state of good health. Realizing, as we must do, that interest depends largely on inborn facility, and that without interest the benefit of recreative pursuits is greatly discounted, we should be well advised not to make a fetish of games as the only means of securing relaxation from work. "Take up golf" is in danger of becoming a tabloid preparation, too easily prescribed, readily swallowed, and not always producing the desired results. To many, a change from one form of mental work to another is much more recreative than the pursuit of a ball whose flight and destination are of much less interest than those of a moth or a bird. It is certainly true, moreover, that a very small amount of muscular exercise will suffice for the maintenance of good health. It is sometimes alleged, and the allegation sounds sensible, that the crowds of people who watch football or baseball on a Saturday afternoon would be better employed playing some game themselves. As their interest cannot be doubted, and as they spend their time in the open air, the conditions favouring relaxation and recreation appear to be adequately fulfilled. On the other hand, it must be admitted that their interest is often more financial than sporting. and therefore predisposes to the development of an anxiety neurosis, which may not always yield to the

recuperative influence of the next week's work. Incidentally, it is our duty to expose the fallacy that the good health, especially the mental good health, of an individual is directly dependent on the size of his muscles. Physical exercises, unassociated with cerebral activity and recreation, are no panacea for mental exhaustion; on the contrary, they constitute a super-tax on the nervous system, and encourage the musculature to make further and uneconomic demands on its limited sources of energy. Muscles are intended to be the servants, not the masters, of man, and the efficiency of their service must be measured not by their bulk, but by the speed and accuracy of their response to the demands of the nervous system.

Perhaps, in order to anticipate remonstrances, I ought to explain that these remarks are not intended to be an attack on physical jerks as a whole. They are directed rather against the craze for various systems of exercises advertised to cure all disorders, whether of the liver or of the nervous system, and largely taken up by the sedentary worker, lacking a hobby, in the vain hope that they may dissipate his weariness of spirit. He may be unaware that this weariness represents a subconscious inhibition of a particular activity, in other words, a psychological state of staleness rather than one of real exhaustion.

RELAXATION

While the question of recreation is complicated by personal idiosyncrasies, and must be answered only after careful consideration of individual needs, that of relaxation deserves perhaps more general examination. Remembering the remarkable capacity shown by nervous centres to recuperate rapidly from fatigue, and taking into account the natural aptitude possessed by certain individuals for long periods of intense work, interrupted by comparatively short spells of complete repose, it may be asked whether more could not be done to acquire and cultivate such enviable powers of alternating concentration and relaxation. The cult of relaxation is no new thing, but, like most cults, may have lacked the recognition it deserves owing to the enthusiasm of its protagonists. At any rate, we are all familiar with individuals who appear to wear themselves out by maintaining a continuous state of restless but unproductive activity. It may be that a scientific study of complete mental and physical relaxation, its methods of induction, its proper relationship to work and play, and its value in everyday life, might show that it is a habit, the acquisition of which is worthy of becoming an item in everyone's education. At any rate relaxation, like work and recreation, is not likely to escape further study, and we may perhaps look forward to the time when we shall be able to switch off our nervous energy as readily as we do our wireless or our electric light, and so regulate its consumption to our better advantage. In these days the problem of utilizing time advantageously is becoming a more and more difficult one, and those who learn early in life how not to waste the hours at their disposal have taken a most important step in achieving such success as lies within their reach.

CONCLUSIONS

In the course of these rather desultory and disjointed remarks no attempt has been made to lay down hard-and-fast regulations governing the prescription of work, rest, or play for the preservation of health or for combating disease. No prescription of the kind can be printed and distributed indiscriminately to all who seek advice on this subject, and no rules can be formulated, applicable to any case, without careful consideration of the individual and personal factors involved.

But if regulations are impossible guiding principles are not without their value, and among these I would emphasize again:

(*a*) The recognition of work as an ally, not an enemy, in therapeutic operations on nervous disease.

(*b*) The paramount importance of a correct diagnosis in functional disorders before determining the part to be played by rest and work in their treatment.

(*c*) The value of physiological and psychological considerations in the choice of recreations.

The subjects to which I have directed your attention, if they are not altogether commonplace, at any rate pertain to everyday life. The questions I have raised are among those which every individual believes he is best fitted to decide for himself. They certainly do not admit of dogmatic answers, and I shall be well content if they stimulate serious consideration and suggest habits and prescriptions of work, rest, and play such as will promote health and prevent disease.

An Address

ON

CERTAIN ASPECTS OF THE PATHOGENESIS OF ANGINA PECTORIS*

BY J. H. MEANS, M.D.,

Boston, Mass.

IN speaking to you to-night on angina pectoris I desire to disclaim at once any expert knowledge of that ailment. I simply want to discuss with you some of the things we all have seen and their significance in the light of various bits of modern work. In the first place, it is necessary to know precisely what we mean by the term angina pectoris. William Heberden[1] invented it and described the disorder in 1768. Little need be added to that original description. Heberden really told pretty much all there is to tell. It is important, however, to bear in mind that the term denotes a symptom, not a disease. It is also well to realize that it should not be loosely applied to every pain in the region of the heart.

The distinguishing features are its paroxysmal incidence, its location in the breast (substernal, and more to the left than right), its relation to effort, and its tendency to end in sudden death. It is in the sense of a symptom approaching this description that I shall use the term. We can add as a further essential quality prompt relief by drugs of the nitrite group. In fact, in doubtful cases, this therapeutic test may be considered the final diagnostic proof.

Of pains in the region of the heart which are not to be regarded as angina pectoris we may mention the more important. In the first place there is so-called "fatigue" pain, dull aching or sometimes stabbing, usually over the heart itself. We find such pain in a variety of conditions, in young people with neurocirculatory asthenia, in certain persons unduly sensitive to tobacco, in organic diseases of the heart such as mitral stenosis, and in hypertension. Presumably it is evidence of myocardial protest, whether the heart is being driven excessively by nervous stimulation or by the handicap of organic cardiovascular disease. It differs from true angina in location, incidence, relation to effort, and response to drugs. When occurring in connection with organic cardiovascular disease, at least, it responds to digitalis rather than to nitroglycerine. There also is pain in certain cases of pericarditis and in aneurysm. These are clearly very different from angina pectoris. Then there is the pain of cardiac infarction, which to my mind is essentially the symptom angina pectoris, continued beyond its usually paroxysmal duration and accompanied by other manifestations which the infarction brings about. In other words, instead of attempting to distinguish between cardiac infarct and angina pectoris as two separate diseases, we shall do better if we say that in the disease known as cardiac infarction angina pectoris of a peculiarly continued sort is a prominent symptom; but the symptom angina often occurs with no infarction of the heart.

The theories in regard to angina are several, but they fall readily into two main groups,—those maintaining its coronary and those maintaining its aortic origin. The former is more ancient and more likely correct. In fact, in the light of present knowledge, it would seem to me that the latter might almost be dismissed. A recent experimental study by Sutton and Lueth[2] does not settle but at least bears strongly on this point. These investigators, in a series of seemingly well planned and executed experiments, observed both the effect of temporary coronary occlusion and of dilatation of the aortic ring in unanæsthetized dogs. They believed that through the animal's behaviour they could accurately detect pain. Restlessness, stiffening of the legs, and whining they regarded as evidence of pain. Salivation they interpreted as evidence of nausea. We need not go into their technique more than to say that traction upon a ligature

* Delivered at a regular meeting of the Montreal Medico-Chirurgical Society, 1930.

placed about the coronary artery invariably produced what they regarded as evidence of pain; dilatation of the aorta or aortic ring by a probang-like affair never did. The evidence of pain immediately disappeared when the coronary ligature was released.

The coronary theories of angina pectoris centre about transient asphyxia of the heart. A spasm of the vessels has been supposed to deprive the myocardium temporarily of an adequate amount of blood—ischæmia. Presumably the temporary occlusion produced by Sutton and Lueth in the dog works in the same way. That spasm of the coronaries can take place in man has never been proved. For that reason Keefer and Resnik[3] offer the hypothesis that anoxæmia can come about merely through a disproportion between the demands upon the heart and its oxygen supply. If because of suddenly increased work the myocardium needs more oxygen, and the coronaries do not allow it to get it, anoxæmia may result even in the absence of any spasm. A similar view probably has been in the minds of other writers who have noted the relation of general metabolic level to the incidence of angina, particularly in cases with over- or under-function of the thyroid gland.[4, 5]

I should like to use the phraseology that the symptom angina pectoris is evidence of relative insufficiency of coronary flow. This state of relativity involves a variety of presumably independent variables. The call for oxygen by the heart muscle, that is to say its metabolism, will depend upon the work the muscle has to do, and upon its efficiency in performing such work. The work required of the heart in turn is conditioned by the general metabolism, the mass movement of blood that that entails and the resistance imposed by the peripheral vessels. The mass movement of blood required to meet a given metabolism, either of the heart itself or of the rest of the body, is of course related to the oxygen carrying power of the blood. More anæmic blood than normal blood will have to be circulated to meet a given metabolic need. Normal coronaries may be expected to permit any increased flow which either the extra metabolism of muscular work or disease may demand, but, as loss of elasticity sets in, the time may come when this will no longer be the case. It is not necessary to assume histological evidence of arterial decay; arteries undergo a progressive diminution in elasticity with age, which may be accelerated by disease. This can be shown for the aorta[6] and may be presumed for the coronary. Theoretically at least, mere decrease in elasticity alone may lead to inadequate flow at the upper levels of myocardial work. Danielopolu,[7] indeed, frankly states that the anatomical theory of angina should be abandoned and in its place we should have a physiological conception of an inadequate coronary circulation, "which may occur when the arteries are healthy, but is more likely when they are in a state of sclerosis." The notion of a disturbance in balance between the work the heart has to do and its coronary supply was clearly in his mind. He attributed the ill-effects of deficient coronary flow to waste products of metabolism rather than to oxygen want. Personally, however, I am inclined to agree with Keefer and Resnik that anoxæmia is the more likely cause. What I mean by relative insufficiency of the coronary flow as a cause of angina is best illustrated clinically in anæmia and in thyroid disease.

In anæmia, inadequacy in flow is conditioned by diminished oxygen-carrying power of the blood. J. B. Herrick[8] has called attention to the association of angina pectoris and severe anæmia in general, and Willius and Giffin[9] have reported the concurrence of angina and pernicious anæmia. In 1560 patients with pernicious anæmia seen at the Mayo Clinic a history of angina occurred in 43 (2.7 per cent). No definite relation between the degree of anæmia and the occurrence of angina was found. The authors conclude that "the anginal syndrome in pernicious anæmia is due presumably to anoxæmia of the myocardium and not to coronary or aortic sclerosis." There is no need, that I can see, for them to add the last clause. Patients with pernicious anæmia often have arteriosclerosis. Decrease in arterial elasticity, as well as anæmia, may play a rôle in the production of their angina. The fact that the incidence of the angina bears no relation to the degree of anæmia strongly suggests that more than one factor is at work. Anæmic blood flowing through inelastic coronaries in one instance may yield angina, while equally anæmic blood flowing through good coronaries in another may not.

That the degree of anæmia bears no relation

to the incidence of angina among different persons is, I believe, if we have an accurate conception of the pathogenesis of angina, what we should expect. On the other hand, if the theory of relative insufficiency of coronary flow is correct, a close relationship between the occurrence of attacks of angina and the level of the hæmoglobin in any given individual should be found. In my experience this has been the case. The best example of this relationship that I can cite is the case of a patient with pernicious anæmia at the Minneapolis General Hospital, about whom, through the courtesy of Professor Fahr, I was permitted to give a clinical lecture at the meeting of the American College of Physicians last year.

CASE 1

This patient, an operator of a stationary engine, aged 57, had enjoyed good health and done heavy work until six months before entering the hospital. He then began to note gradually failing strength and increasing dyspnœa on effort. Two months before entry, for the first time in his life, he had an undoubted severe attack of angina pectoris while walking to his home with a heavy parcel of groceries in each hand. When the pain came on he had gone two blocks and had thirteen more to go. The pain was described as tearing, located over his heart. He was obliged to stand stock still until it passed off. He walked the rest of the way with difficulty, having six to eight more attacks en route. From then on until entry to the hospital his condition steadily grew worse. The attacks of pain occurred nearly every day and were closely related to effort. The trend was for them to come on less and less exertion. In the terminology of his trade he said he was "like an engine losing steam". Symptoms of pernicious anæmia were likewise present and increased along with the angina, sore tongue, yellow pallor, numbness in fingers and toes, anorexia, loss of weight, dizziness on stooping, and a staggering gait. The physical examination showed no abnormality of the heart, but pallor, icteric tint, atrophic tongue, palpable spleen, and Romberg's sign were present. The blood picture was typical of pernicious anæmia: hæmoglobin 39 per cent and 1.7 million red cells. Gastric analysis showed achlorhydria. In three weeks in the hospital on liver therapy he gained half a million red cells; the hæmoglobin rose from 39 to 46. He felt better in nearly every way. His appetite and strength improved; his tongue ceased to be sore, and his angina disappeared. It was at this time that I saw him. I have just had a letter from Professor Fahr in which he says that last July the patient's red count was over 5 millions and his hæmoglobin was 100 per cent. He had had no further angina and was apparently perfectly well.

When we come to the field of thyroid disease we encounter angina under two sets of circumstances. First, in a number of cases of thyrotoxicosis, we have seen pain having many of the classic characteristics of angina which has disappeared after abolition of the thyrotoxicosis. Effort superimposed on the high basal metabolic level of the thyrotoxic state has presumably put a greater demand on the coronary circulation than it could stand, and angina has resulted. After the basal rate has dropped to normal, the same or greater effort fails to produce the pain. This would seem to me to bear out admirably the principle of relative insufficiency of coronary flow. In this connection I should like to cite one case.

CASE 2

A housewife, aged 62, entered the Massachusetts General Hospital on January 9, 1930. Her major complaints were a rather continuous, dull, epigastric ache, and attacks of very sudden sharp epigastric pain brought on by exertion and radiating to the back and down the left arm. Occasionally, there was less marked radiation to the right arm as well. This symptom had been present for nearly a year. In addition, for three to four months there had been gradually increasing dyspnœa, and finally orthopnœa. She also was becoming nervous and jumpy and had trembled a good deal. She had noted slight prominence of her eyes. Her heart had begun to palpitate and her appetite and sweating were increased.

On physical examination she gave the impression of rather acute thyrotoxicosis. There were slight eye signs and a rather small goitre, with the enlargement chiefly in the region of the isthmus. Thrill and bruit were present over both upper poles. The tremor was very marked and the skin sweaty and hot. The heart was thought to be enlarged, but this was not confirmed by x-ray. There was the usual systolic murmur of exophthalmic goitre, tachycardia and wide pulse pressure, 160/70. The basal metabolic rate on admission was plus 71 per cent.

There was evidently no doubt of the presence of exophthalmic goitre; the angina, as well, seemed fairly typical. One interesting feature was that although the pain had the classical relation to exertion it also was aggravated by lying flat. This put us in mind of the observations of A. V. Bock *et al.*[10] that the blood flow is faster lying flat than in the upright, resting posture. In the ward the pain was found to respond in characteristic fashion to nitroglycerine, which seemed to us to confirm the diagnosis of angina.

The patient was given iodine and made a satisfactory response. As the basal metabolic rate dropped the angina disappeared. This occurred on iodine even before operation. On February 11th, a subtotal thyroidectomy was done. She stood this well and was discharged on February 21st with a basal metabolic rate of plus 11 per cent. She was seen again on May 7th and appeared to be doing well. After discharge she had had what apparently was pneumonia, which had been followed by some persistent cough. Her basal metabolic rate was minus 4 per cent, and there was no evidence of thyrotoxicosis. The angina had not returned.

The other thyroid situation in which we meet angina is that of myxœdema when thyroid is administered in too large dosage. The application of the principle of relative insufficiency of coronary flow is the same as in thyrotoxicosis, only here we are raising the metabolic rate by feeding the hormone instead of lowering it by removing thyroid gland. Our therapy, in other words, conditions the angina; therefore, we must exercise caution in giving the drug, so that we shall not give too much. The

aim should be the minimum dose that will rid the patient of the clinical signs of myxœdema, not the establishment of any particular metabolic rate. In the cases that develop angina the dose of thyroid must be less than the one which makes the symptom possible, and sometimes we even have to allow slight evidence of myxœdema to remain in order to fulfil this indication.

Another instance of angina pectoris developing as a result of elevation of metabolic rate induced by the administration of a calorigenic hormone is that found in the case of epinephrine. Like thyroxine, epinephrine causes a characteristic increase in oxidative rate. The time relations differ in that increase in metabolism after epinephrine injection takes place at once and reaches its peak in from twenty to forty minutes, passing off completely in less than three hours, whereas the thyroxine peak is not reached until about five days and the effect takes anywhere from twenty to ninety days to pass off completely, depending upon the basic level at the start. Levine and his collaborators[11] have suggested the use of epinephrine as a diagnostic test in cases of suspected angina. In ten out of eleven patients with histories of angina pectoris the injection of 1 c.c. of epinephrine caused a typical attack. From the point of view of the theory of angina that we are discussing, it is interesting to note that in these observations the average time required for the development of the pain was twenty minutes, which coincides fairly closely with the peak of the calorigenic curve. The pain comes on at the time of greatest metabolic demand.

There is another point about the action of epinephrine which needs to be stressed especially. Whereas in the case of thyroxine it can be shown by blood flow estimations that metabolism and mass movement of blood increase in like proportion, in that of epinephrine the increase in blood flow is relatively greater than that of metabolic rate.[12] Thyroxine seems to call forth a circulatory response just equal to metabolic needs, epinephrine on the contrary whips up the circulation apparently far beyond such need. For example, it was found by Field and Bock[13] in a normal subject that an epinephrine injection which caused a rise of 20 per cent in basal metabolic rate caused a rise in blood flow of 94 per cent; whereas in the hyperthyroidism of Graves' disease the average elevation in the basal metabolic rate of four subjects above that of healthy individuals was plus 65 per cent, and in the blood flow 86 per cent. Furthermore, Means and Newburgh[14] found that when in a normal subject the metabolism was raised 65 per cent by muscular work, the blood flow increased but 55 per cent. We must also remember that epinephrine causes a rise in blood pressure. In the series of Levine *et al.*, the systolic pressure rose from 12 to 100 mm. with an average of 58 mm. In the action of epinephrine, therefore, we have an increase in minute volume of blood flow and of arterial pressure at the same time. It can be taken as certain, then, that epinephrine greatly increases the work of the heart. It is small wonder that in those whose coronaries are less elastic than they once were the symptom angina is produced. Although epinephrine is said to cause some dilatation of the coronaries this is more than offset by the demand put upon them to allow blood to pass. While the work of Levine and his collaborators is interesting and furnishes added evidence in favour of theories previously conceived, I must confess that the propriety of using the injection as a diagnostic test seems to me open to some doubt. In cases of pain of doubtful origin, instead of using a drug which may bring on an attack, it is safer to wait for a spontaneous attack and then follow the ancient custom of observing whether nitroglycerine gives any relief.

A totally different, but also important, aspect of the pathogenesis of angina pectoris lies in the threshold of sensitivity to pain. Every physician knows well that individuals vary greatly in this respect. What causes pain in any one individual at one time may not do so at another. Such variations certainly play a rôle in determining the occurrence of the symptom angina.

The difference between whites and blacks is interesting in this respect. Although total deaths from cardiovascular disease related to total deaths from all causes for the middle and late decades of life are not grossly different in the two races, the deaths from angina pectoris related to deaths from all causes is vastly greater in the whites than in the blacks. In other words, coloured persons die about as often of cardiovascular disease as do whites, but they die far less frequently with the symptom angina pectoris. I believe this is due not

to a lower frequency in them of the circulatory factors which take part in the pathogenesis of angina, but rather to a far lower susceptibility to pain. Paullin,[15] of Atlanta, has noted this racial difference in the pain of aneurysm, and Carter, of Baltimore,[16] has commented on the rarity of pain as an expression of angina pectoris in coloured people. Libman's observations[16, 17, 18] on sensitiveness to pain are of considerable interest in this connection. This investigator has devised a rough test for pain sensitivity which consists in making pressure just over the tip of the mastoid, then over the styloid process of the temporal bone. In some people, whom he calls "hyposensitives", these manœuvres cause little or no pain; in others they cause marked pain; the latter he calls "hypersensitives". Persons having typical angina pectoris are for the most part hypersensitive. When the pathogenesis of angina is operative in hyposensitives they are apt to have what Libman calls "substitution symptoms". Instead of having pain they will have burning, coldness, or a sense of pressure or constriction in the chest or throat, or a feeling of swelling in the arm. If pain is present it is apt to be on the right side—contralateral. We have all seen, I fancy, patients of this type who have feelings of pressure or constriction without pain, and tingling or some other paræsthesia in the arm. These manifestations evidently are akin to angina since they are relieved by nitroglycerine. Libman has further found that in hyposensitives with undoubted coronary thrombosis there may be little or no pain, and instead dyspnœa, sweating, general weakness, and collapse. Most of us have also, I am sure, seen patients of this kind. Libman likewise draws attention to what he calls "sensitization" and "desensitization" to pain, that is raising or lowering of sensitivity to pain by such factors as emotion, other pains, disease, etc. What will cause pain in an individual when sick or worried may not do so when he is well and in a normal state of mind. Further light on this is thrown by the work of Foerster[19] who finds, using a quantitative method for determining sensitivity to pain, that psychological factors, such as emotion and hypnosis, cause marked variations, although when stimuli are applied to a part deprived of its sympathetic nervous system connection, the sensitivity appears to be fixed. This may be a highly fundamental principle and indicates that the emotional conditioning of our sensitivity to pain is dependent on the integrity of our sympathetic nervous system. As a matter of fact it is around the sympathetic nervous system that the chief interest in angina pectoris lies to-day. The conception of sympathetic nervous system pain is comparatively new, and although it may now be considered proved that pain impulse is borne from the viscera by the sympathetic alone, it still remains in doubt whether sympathetic centripetal fibres run from the peripheral parts as well.

The French surgeon Leriche,[20] in discussing the surgery of pain, has stated that there are two great types of pain, cerebrospinal and sympathetic. The first has a classic anatomical topography. It is very fixed and without radiation. Sympathetic pain, on the other hand, is not sharply systematized; it is diffuse; it has a gradually widening area of reference, and varies in intensity with the emotional state. The pain of angina pectoris fulfils this description. It is not sharply localized, does tend to spread, and varies in intensity from attack to attack, which vary in degree, and the area involved may be related to the intensity of the attack. In lesser attacks only the sternal or precordial area may be involved. With somewhat more severe ones the characteristic radiation down the left arm may appear, and finally in the most severe the extension may be up the left side of the neck, face, jaw, head, and even to these various regions upon the right side. I like to think of the spread of the pain as similar to the waves which spread from the point at which a stone is tossed in water. The waves caused by a large stone radiate farther than those from a small.

Angina pectoris is now known to be a referred pain. Interruption of the pathway at various points shows that the route from the heart is via sympathetic fibres over the upper, middle and lower cardiac nerves to the cervical sympathetic trunk, and also by certain fibres running directly into the stellate and upper dorsal ganglia. From the sympathetic trunk afferent impulses provoking the pain enter the spinal cord via the communicating rami of the upper dorsal nerves, and the sensation is referred by the sensory cortex to the superficial spinal segment areas which correspond. This is for the most part that of the eighth cervical

and first to fourth dorsal, but in severe attacks, in the upward spread, all the upper cervical segments may become involved. Indeed, in occasional instances the sensation can be observed to invade the territory of the fifth cranial nerve as well. Occasionally we find downward spread and spreading at various levels to the right. Particularly is this true in the angina that accompanies acute infarction of the heart. Once in a while the radiation instead of being to the left, as is the classic state, starts upon the right.

A very beautiful piece of work throwing light on the mechanism of referred visceral pain has been done by Weiss and Davis[21] at the Boston City Hospital. These investigators in order to test the hypothesis that "visceral pain is caused by the normal afferent impulses from the skin entering a cord segment which has become abnormally irritable as a result of visceral bombardment" anæsthetized by means of local novocain injection the skin areas over which such pains are felt. In three patients having rather prolonged seizures of angina pectoris, the pain was immediately relieved by anæsthetizing the precise skin area where the pain was felt. In one case after anæsthetization of the area, a new area just outside the original one became painful. Extension of the local anæsthesia to include this area caused complete relief. These observations are significant, not only from the point of view of physiology but also from that of therapeusis. The mechanism of the pain sensation in angina seems clearly to involve the irritation of a spinal segment by afferent impulses from the heart via the sympathetic system, and in consequence the interpretation by the sensory cortex as painful of ordinary afferent impulses from the skin area supplied by that spinal segment. From the therapeutic point of view it becomes apparent that interruption of this pathway on either the sympathetic or central nervous system side may be expected to stop the pain, and the work of various investigators seems to show that this is true. I mentioned earlier the experiments of Sutton and Lueth. In addition to showing that occlusion of the coronary gives evidence of pain, they find that occlusion does not give evidence of pain when the sympathetic pathway from the heart has been interrupted in various ways.

The treatment of angina pectoris by interruption of the path of reference of the pain dates from 1916, when Jonnesco[22] removed all the cervical and first dorsal ganglia on both sides. Various less extensive sympathetic ganglionectomies have been reported since, producing various degrees of relief. In 1926 Swetlow[23] began interrupting the pathway by injecting the ganglia with alcohol instead of by operation, and J. C. White[24, 25] at the Massachusetts General Hospital has been treating patients by Swetlow's method since 1927. The results have been remarkably good. To date 19 patients have been injected, 14 showed marked benefit, 2 received some benefit, and 3 were unrelieved. There were no deaths resulting from the procedure. E. P. Richardson and P. D. White,[26] comparing the results of cervical sympathectomy and alcohol injection last year, concluded that the latter procedure gave better results and carried less risk. As compared with the results for alcohol injection mentioned above, those for cervical sympathectomies of various sorts, as done at the Massachusetts General Hospital, were: improved 4 (40 per cent), unimproved 4 (40 per cent), died 2 (20 per cent).

The most important recent aspect of all this work is the realization that interruption must be made at the levels of the stellate and upper dorsal ganglia rather than higher up. It is at these levels that the crossover to the central nervous system takes place and removal of the upper and middle cervical ganglia may not do the job. The alcohol injections that I have mentioned have included the upper part of the dorsal chain. Of operative sympathectomies for angina in this region we have but four, but pain was completely relieved in all, with one death shortly after operation.

May I now, in the moments that remain, present to you two case histories which are pertinent to the neurology of angina in quite widely different ways.

CASE 3

The first is that of a man of 61, now upon the medical service at the Massachusetts General Hospital. He was treated in our out-patient department thirteen years ago for syphilis, the sole evidence of which was a positive Wassermann discovered in the course of a routine examination for another complaint at that time. In November, 1926, he began having attacks of pain, typical of angina pectoris in all respects, except that it was precordial rather than substernal. There was no radiation, but the relation to effort was exact and nitroglycerine gave relief. After a year of this, in November, 1927, he entered the hospital and thorough studies were made. Syphilitic heart disease was strongly considered, but finally decided against. The Wasser-

mann at this time was negative. Examination of the heart showed dullness of 10 cm. to the left, midclavicular line 9.5 cm., and no enlargement to the right. The rhythm was normal and the pulse rate not increased. The sounds were rather distant, with a rough systolic murmur at both apex and base. The aortic second sound was slightly accentuated. By x-ray the size of the heart was found to be within normal limits and the aorta showed some tortuosity but no dilatation. The electrocardiogram showed nothing abnormal. The blood pressure was 160/80. Urine and renal function tests were normal. He remained in the ward for two weeks, during which time his pulse averaged 60. He was given digitalis, grains i ss. per diem, and potassium iodide, grains five t.i.d. As his angina was crippling he was offered paravertebral alcohol injection, but refused.

After discharge he lived a very restricted indoor life at the house of a sister. Under this regime he gradually got better and last summer was able to take short walks without pain, which previously would have caused pain. In September, however, his attacks returned, brought on by even less effort than before, though still relieved by nitroglycerine. On November 10th, last, as the patient went to stool, he was seized with a new and different and more severe pain. It was located over an area about the size of the palm of the hand in the region of the spine of the left scapula, and radiated down the inner aspect of his left arm to the third, fourth and fifth fingers. It was very severe, and burned and tingled in a very distressing way. The skin over the affected area was very tender to the touch. This pain persisted for two weeks and was uninfluenced by nitroglycerine.

He entered the hospital on November 24th and lesions typical of herpes zoster were found over the left upper scapula region behind and over the inner aspect of the arm from axilla to hand. They were confined in fact very closely to the segmental areas of the eighth cervical through the third dorsal. The heart at this time showed no increase in size over the last entry, either by physical examination or by x-ray. The sounds were as before. The rate averaged 60 and the blood pressure was 180/90. The electrocardiogram showed normal rhythm and low T_2 and inverted T_3.

The chief interest of this case lies in the coexistence of angina and herpes and the speculation as to whether there is any causal relation between the two. Parsonnet and Hyman[27] have recently reported three cases in which angina pectoris followed herpes zoster involving the chest or left arm. The coexistence of the two conditions has been noted in the past by Mackenzie.[28] I do not believe that there really is any causal relation between the two, but they are of interest because of the similarity in the distribution and, in some respects, the quality of the pain. The tingling and burning seen in herpes may occur in angina. The same peripheral spinal pathways are employed. This case is also of interest as showing that coronary occlusion is another of the things that herpes zoster can imitate. In this case, when the history was taken, this possibility was entertained, but the finding of the herpes and the absence of other evidence of coronary block ruled it out.

CASE 4

The other case is that of a woman of 49 years, a patient of Drs. Stanley Cobb and W. J. Mixter, whom I have had an opportunity to observe closely for many years. Sixteen years ago she began having left-sided trifacial neuralgia for which various peripheral alcohol and nerve resections were done. None of them gave lasting relief, and in 1922 a Gasserian ganglion operation was done. This gave partial relief for two years, then the pain began to return.

The pain following the Gasserian ganglion operation is what I wish to consider here. It gradually extended beyond the area supplied by the fifth nerve, being felt behind the ear, in the left occipital region and low in the neck, above the middle of the clavicle and along the posterior border of the sternomastoid muscle. These regions are all within the areas of cervical segments one to three. There were paroxysms of darting pain and also marked persistent hyperæsthesia and tenderness in the areas involved. There was also a rather remarkable paroxysmal and painful spasm of the tongue, which first appeared about four years ago, in isolated attacks at first, but becoming very persistent through the spring and summer of 1929. As to the nature of these various residual phenomena there was considerable speculation. Doctors Cobb and Mixter inclined finally to the view that the sympathetic played an important rôle. On October 23, 1929, therefore, Dr. J. C. White did a diagnostic paravertebral novocain sympathetic block. This temporarily abolished the pain in the neck, face, and behind the ear, but did nothing to the tongue.

The tongue symptom, however, was cured by a resection of the lingual nerve on November 15, 1929. The rest of the picture continued, so a sympathectomy was decided upon and on March 11, 1930, Dr. Mixter removed the left stellate and second dorsal ganglia. This operation has been a brilliant success. The pain and tenderness have gone, save that after emotion there will be a slight temporary recurrence of both in an area above and behind the ear.

The interest of this case for the present discussion lies in the similarity between the distribution of the pain and that seen in certain cases of angina pectoris, and the fact that the pain was relieved by an operative procedure that will also relieve the pain of angina. Reference to the areas of the first to third cervical is not uncommon in angina, and I have seen one case with tongue symptoms not unlike this patient with residual neuralgic pain.

It has been observed both by Leriche[29] and by Foerster[19] that stimulation of the superior cervical ganglion causes pain in the region of the lower jaw, the side of the face, and behind the ear; that of the middle, pain in the side of the neck; while stimulation of the stellate gives pain deep in the chest like angina. A case of angina has also been noted by Brow[30] in which very severe pain behind the left ear and down the inner side of the arm resulted when a surgeon put a snap on the superior cervical ganglion during sympathectomy under novocain. The pain was quite like the angina the patient had had spontaneously, and it ceased as soon as the nerve was cut.

I am not venturing to suggest that there is any etiological relationship between angina pectoris and post-gasterectomy neuralige pain. They both, however, seem to be types of sympathetic pain, and relievable by interruption of the sympathetic at precisely the same point. One is led to wonder whether the original neuralgia itself, like angina, may be simply a referred pain with a sympathetic-borne impulse expressing itself like angina over the distribution of spinal and, in this case, the fifth cranial nerves. If such a theory is correct the Gasserian operation would be an interruption of the central nervous system end of the reference arc. It would be the equivalent of Weiss' peripheral anæsthesia. When the trigeminal has been destroyed the pain may spread to other areas following the characteristics of sympathetic pain. One of Weiss' cases of angina already cited, in which after anæsthetizing one area pain appeared in a new one, is pertinent in this connection; so too is Libman's theory of substitution pain. What produces the sympathetic irritation is utterly unknown, but it at least appears that the trigeminal nerve may be a mere incident rather than the seat of the cause of the disorder.

In conclusion, I would like to leave with you the thought that the factors playing a part in the production of angina pectoris are complex. Further, that in studying your patients it is worth while to speculate as to what these factors are. Such attempt at visualization of the morbid physiology involved will be helpful in planning treatment in any given case. If metabolic or hæmodynamic factors, as in anæmia, can be corrected, well and good; often there are none such that can be attacked. In general it is important to keep the demand upon the coronaries, from the point of view of work performed, within the limit they can stand, but it is equally important to recall and treat the emotional factors which may play a very vital rôle. The psychotherapy of angina, which may be of a very simple sort, reassurance, encouragement to the patient to do as much as he can within his limit, is a very essential part. The new treatment by sympathetic block, we believe, is indicated only when attacks are so frequent and severe that the handicap is great.

REFERENCES

1. HEBERDEN, Commentaries, p. 292.
2. SUTTON AND LUETH, *Arch. Int. Med.*, 1930, **45:** 827.
3. KEEFER AND RESNIK, *Arch. Int. Med.*, 1928, **41:** 769.
4. CHRISTIAN, *Rhode Island Med. J.*, 1925, **8:** 109.
5. MEANS, WHITE AND KRANTZ, *Boston M. & S. J.*, 1926, **195:** 455.
6. BOCK, BAUER AND MEANS, *Proc. Nat. Acad. Scien.*, 1928, **14:** 675.
7. DANIELOPOLU, *Brit. M. J.*, 1926, **1:** 180.
8. HERRICK, *Am. Heart J.*, 1927, **2:** 351.
9. WILLIUS AND GIFFIN, *Am. J. M. Sc.*, 1927, **174:** 30.
10. LAWRENCE, HURXTHAL AND BOCK, *J. Clin. Invest.*, 1927, **3:** 613.
11. LEVINE, ERNSTENE AND JACOBSON, *Arch. Int. Med.*, 1930, **45:** 191.
12. MEANS, *Endocrinology*, 1925, **9:** 192.
13. FIELD, JR., AND BOCK, *Proc. Am. Soc. Clin. Invest.*, 1925.
14. MEANS AND NEWBURGH, *Trans. Ass. Am. Phys.*, 1915, **30:** 51.
15. PAULLIN, personal communication.
16. CARTER, in discussion of paper by Libman, *Trans. Ass. Am. Phys.*, 1929, **44:** 52.
17. LIBMAN, *Trans. Ass. Am. Phys.*, 1926, **41:** 305.
18. LIBMAN, *Proc. Staff Meetings Mayo Clinic*, 1927, **2:** 273.
19. FOERSTER, personal communication to Dr. J. C. White.
20. LERICHE, *Presse méd.*, 1927, **35:** 497 and 561.
21. WEISS AND DAVIS, *Am. J. M. Sc.*, 1928, **176:** 517.
22. JONNESCO, *Bull. Acad. de méd.*, 1920, **84:** 93.
23. SWETLOW, *Am. Heart J.*, 1926, **1:** 393.
24. WHITE AND WHITE, *J. Am. M. Ass.*, 1928, **90:** 1099.
25. WHITE, *Arch. Neurol. & Psychiat.*, 1929, **22:** 302.
26. RICHARDSON AND WHITE, *Am. J. M. Sc.*, 1929, **177:** 161.
27. PARSONNET AND HYMAN, *Ann. Int. Med.*, 1930, **3:** 883.
28. MACKENZIE, Diseases of the heart, 3rd ed., London, 1913, p. 89.
29. LERICHE, personal communication to Dr. J. C. White.
30. BROW, *Canad. M. Ass. J.*, 1927, **17:** 1139.

TYPHOID PHLEBITIS AND PULMONARY INFARCTION.—P. Voignier states that pulmonary embolism is a rare occurrence in the course of typhoid phlebitis. The possibility of its occurrence, however, renders immobilization as necessary as in any other form of phlebitis. Embolism may give rise to sudden or rapid death, and should always be looked for at the necropsy of a typhoid patient who has died suddenly. Pulmonary embolism may also be manifested by hæmoptysis. The pathogenesis of infarcts occurring during typhoid fever may be very complicated, but the coexistence of phlebitis and an infarct renders their embolic origin very probable. The prognosis of pulmonary embolism in typhoid fever should be very guarded, owing to the diminished resistance of the patient and especially the involvement of the myocardium. The thesis contains the histories of three cases in patients aged 15, 19, and 36, two of which were fatal, while the third patient only became convalescent after an illness of three months' duration.—*Thèse de Paris*, 1930, No. 307.

THE ANTERIOR-PITUITARY-LIKE HORMONE OF THE HUMAN PLACENTA

BY J. B. COLLIP, D. L. THOMSON, M. K. MCPHAIL,* AND J. E. WILLIAMSON

Department of Biochemistry, McGill University,

Montreal

INTRODUCTION

REFERENCE has been made in previous papers[6, 7] to the fact that the alcohol-insoluble residue obtained in the process of fractionation of human placental extracts (in the preparation of emmenin) contained an active principle, injection of which into immature female rats resulted in the production of œstrus, as judged by the vaginal smear, and of corpora lutea in the ovaries. In the numerous publications which have appeared recently on the gonad-stimulating substance of pregnancy urine and blood, and of the placenta, it has been for the most part assumed that the active principle or principles found therein are identical with the principle or principles elaborated by the anterior lobe of the pituitary gland. Since the anterior-pituitary-like hormone of the human placenta may be readily extracted and purified to a degree sufficient to allow of its being administered subcutaneously or intramuscularly, a series of animal experiments has been carried out with such preparations, and the results are presented in condensed form in the accompanying tables and figures.

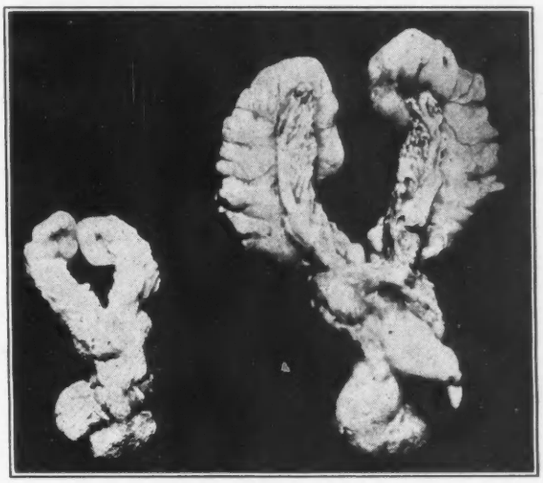


FIG. 1.—Showing seminal vesicles and prostate of control (left) and experimental adult rat (right). Anterior-pituitary-like hormone—the equivalent of 15 grams of placenta—administered daily, except Sunday, for 42 days.

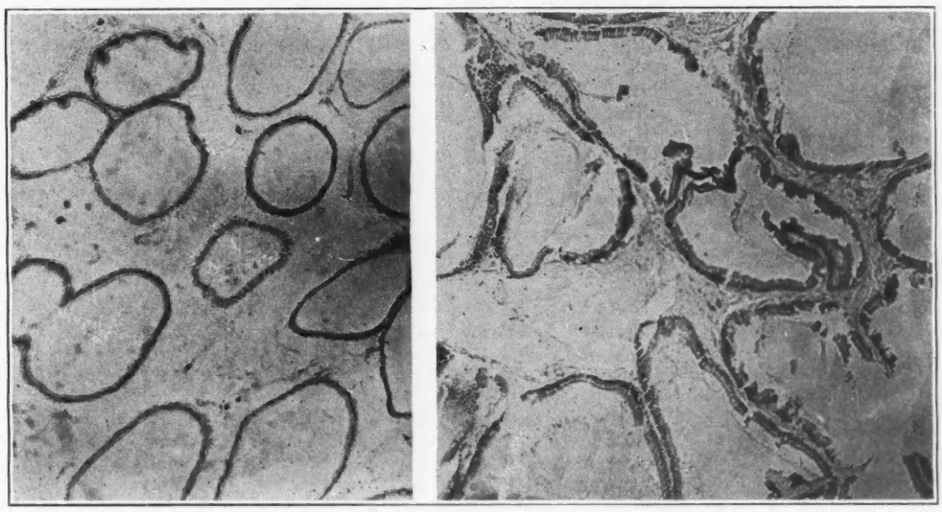


FIG. 2.—Left: Photomicrograph of prostate gland of control normal adult rat. Right: Photomicrograph of prostate of experimental animal after 42 injections of anterior-pituitary-like hormone of placenta. Note the increase in the size of the alveoli, and the high columnar epithelium, and the decrease of interstitial tissue in the gland of the experimental animal. (Both sections were equally magnified.)

* Holding a National Research Council Studentship.

TABLE I.

IMMATURE MALE RATS (18-24 DAYS OF AGE) INJECTED WITH SULPHOSALICYLIC ACID PREPARATION OF PLACENTAL EXTRACT

Dose Gms.	*Duration Days*	*No. of Experiments*	*Average Weights of Exp. Animals Gms.*		*No. of Controls*	*Average Weights of Controls Gms.*		*Average Difference Per Cent*
2/9	6-12	8	Body Wt.	54.00	6	Body Wt.	56.00	- 3.5
			Testes	0.38		Testes	0.40	- 5
			*S. V. & P.	0.13		S. V. & P.	0.09	+ 44.5
2/9	14-20	10	Body Wt.	61.00	9	Body Wt.	83.00	- 26.5
			Testes	0.72		Testes	0.80	- 11
			S. V. & P.	0.34		S. V. & P.	0.12	+183
4/9	7-11	8	Body Wt.	77.00	5	Body Wt.	79.00	- 2.5
			Testes	0.63		Testes	0.73	- 13.7
			S. V. & P.	0.23		S. V. & P.	0.12	+ 91.7
4/9	18-21	5	Body Wt.	107.00	3	Body Wt.	122.00	- 12
			Testes	1.03		Testes	1.27	- 19
			S. V. & P.	0.58		S. V. & P.	0.22	+163.6

*(S. V. = Seminal Vesicles and P. = Prostate.)

TABLE I.—Showing the growth stimulating effect of the Wiesner placental extract upon the seminal vesicles and prostate gland of immature white rats. Note the absence of effect upon the testes.

TABLE II.

SHOWING EFFECT OF CRUDE PLACENTAL EXTRACT ON MALE RATS AGED 24-25 DAYS

		Experimental Animals			*Controls*			
Dose Gms.	*Duration Days*	*No. of Experiments*	*Average Weights Gms.*		*No. of Animals*	*Average Weights Gms.*		*Difference Per Cent*
5	20	3	Body Wt.	95.00	2	Body Wt.	107.00	- 11.2
			Testes	1.09		Testes	1.29	- 15.5
			S. V. & P.	0.74		S. V. & P.	0.14	+428.5
			*Epi.	0.34		Epi.	0.15	+126.7
5	24	3	Body Wt.	80.00	2	Body Wt.	120.00	- 33
			Testes	1.20		Testes	1.70	- 29
			S. V. & P.	1.42		S. V. & P.	0.18	+689
			Epi.	0.25		Epi.	0.29	+ 4
5	52	1	Body Wt.	125.00	1	Body Wt.	176.00	- 29
			Testes	1.35		Testes	0.92	+ 47
			S. V. & P.	2.39		S. V. & P.	0.99	+140
			Epi.	0.57		Epi.	0.61	- 7
5	57	1	Body Wt.	84.00	1	Body Wt.	175.00	- 56
			Testes	0.99		Testes	2.16	- 57
			S. V. & P.	2.19		S. V. & P.	0.91	+141
			Epi.	0.43		Epi.	0.69	- 37
5	57	1	Body Wt.	94.00	1	Body Wt.	183.00	- 48
			Testes	1.03		Testes	1.92	- 86
			S. V. & P.	0.42		S. V. & P.	0.80	- 45
			Epi.	0.59		Epi.	0.60	- 2

*(Epi = Epididymis)

TABLE II.—Showing the effect of a placental extract made by extracting the fresh tissue with one and one-eighth volume of acetone upon young rats injected daily for periods of from 20 to 57 days. Such an extract is relatively very crude and is mildly toxic, as shown by the inhibition of general body growth. It contains both emmenin and the anterior-pituitary-like hormone.

PREPARATION OF THE EXTRACT

The extract which has been used in these experiments, except where otherwise stated, has been prepared by a method which embodies the principle of the technique employed by Zondek and Aschheim[18] and Biedl[1] for extracting pregnancy urine.

Fresh human full-term placentæ are ground to pulp and extracted with one and one-eighth volumes of absolute chemically pure acetone. The resulting extract is acidified with 0.5 c.c. of glacial acetic acid per litre of fluid. The acetone is removed by distillation at low temperature and pressure, and the aqueous fluid thus obtained is treated with 10 grams of Lloyd's reagent. After filtration the aqueous extract is further reduced in volume by distillation at low temperature and pressure, until a ten- to twenty-fold concentration has been attained. Ten volumes of 95 per cent ethyl alcohol are then added to the concentrate, and the mixture is allowed to stand for 24 hours, and is then filtered. The precipitate, which contains the anterior-pituitary-like principle dealt with in this paper, is extracted with distilled water. The insoluble residue which is obtained at this time is discarded; it contains much calcium sulphate. The filtered aqueous extract of the precipitate referred to above, after reduction to a convenient volume in the still at low temperature and pressure, is treated with 10 volumes of 95 per cent ethyl alcohol. The precipitate obtained is extracted with distilled water as before and again precipitated with 10 volumes of 95 per cent ethyl alcohol. The process of solution in water and reprecipitation from alcohol is repeated in all five times. Ether extraction in dilute acetic acid solution is then carried out, and finally the aqueous solution is adjusted to pH 5-6 and a sodium chloride content of 0.9 per cent, and sterilized by Berkefeld filtration. The extract is made to contain the equivalent of from 25 to 100 grams of original placenta per c.c. and may be standardized in terms of rat units. Total solids are of the order of 1 mg. per gram, and total nitrogen 0.04 mg. per gram of original placenta. The ash content of these solids, exclusive of the added NaCl, is 25 per cent.

TABLE III.

IMMATURE MALE RATS (18-21 DAYS OLD) INJECTED WITH ANTERIOR-PITUITARY-LIKE FRACTION OF HUMAN PLACENTA

Dose (Daily) Gms.	*Duration Days*	*No. of Experiments*	*Average Weights of Exp. Animals Gms.*		*No. of Controls*	*Average Weights of Controls Gms.*		*Average Difference Per Cent*
½	10	4	Body Wt.	50.00	3	Body Wt.	58.00	− 14
			Testes	0.53		Testes	0.56	− 5
			S. V. & P.	0.13		S. V. & P.	0.12	+ 8
			Epi.	0.08		Epi.	0.07	+ 13
½	24	2	Body Wt.	115.00	2	Body Wt.	116.00	− 0.8
			Testes	1.53		Testes	1.52	0
			S. V. & P.	0.28		S. V. & P.	0.22	+ 27
			Epi.	0.22		Epi.	0.21	+ 47
2½	10	2	Body Wt.	72.00	1	Body Wt.	72.00	0
			Testes	0.73		Testes	0.71	+ 2.8
			S. V. & P.	0.21		S. V. & P.	0.14	+ 50
			Epi.	0.12		Epi.	0.10	+ 20
3¼	19	1	Body Wt.	95.00	1	Body Wt.	83.00	+ 14.5
			Testes	0.89		Testes	1.00	− 11
			S. V. & P.	0.24		S. V. & P.	0.15	+ 60
			Epi.	0.18		Epi.	0.11	+ 64
2½	20	5	Body Wt.	86.00	4	Body Wt.	94.00	− 8.5
			Testes	1.16		Testes	1.29	− 10
			S. V. & P.	0.33		S. V. & P.	0.18	+ 84
			Epi.	0.18		Epi.	0.16	+ 12
7½	13-18	3	Body Wt.	67.00	2	Body Wt.	73.00	− 7
			Testes	0.66		Testes	0.85	− 22
			S. V. & P.	0.27		S. V. & P.	0.18	+ 50
			Epi.	0.13		Epi.	0.10	+ 33⅓
25	8-12	4	Body Wt.	57.00	3	Body Wt.	57.00	0
			Testes	0.55		Testes	0.50	+ 10
			S. V. & P.	0.25		S. V. & P.	0.11	+127
			Epi.	0.14		Epi.	0.11	+ 27
25	22	2	Body Wt.	94.00	2	Body Wt.	96.00	− 2
			Testes	1.01		Testes	1.21	− 16
			S. V. & P.	0.39		S. V. & P.	0.27	+ 44
			Epi.	0.23		Epi.	0.14	+ 64

TABLE III.—Effect of daily injections of a partially purified extract containing the anterior-pituitary-like principle of the placenta upon immature male white rats. Note the consistent growth-stimulating effect of the treatment upon the epididymis, the seminal vesicles and the prostate gland, with little or no effect upon the testes and body weight.

As a rule, the equivalent of one gram of placenta injected daily for two or three days into a 21-day old female white rat results in a positive vaginal reaction on the fourth or fifth day. Such doses normally have little effect upon the ovary, and two or three times this dose may have to be employed to obtain an appreciable increase in the weight of the ovary, or the appearance of corpora lutea.

RESULTS AND DISCUSSION

A noteworthy property of the extracts used in these experiments is the consistent response which their administration by injection to immature or adult male rats produces in regard to the rate and degree of growth of the accessory sex organs. This is shown in detail in Tables I to IV inclusive, and in Figs. 1 and 2.

Castrated male animals are not affected (see

TABLE IV.

ADULT MALE RATS (2½ TO 8 MONTHS) INJECTED WITH ANTERIOR-PITUITARY-LIKE FRACTION OF HUMAN PLACENTA

Age Mos.	*Dose Gms.*	*Duration Days*	*No. of Experiments*	*Average Weights of Exp. Animals Gms.*		*No. of Controls*	*Average Weights of Controls Gms.*		*Average Difference Per Cent*
8	15	7	2	Body Wt.	325.00	2	Body Wt.	300.00	+ 8
				Testes	2.79		Testes	2.65	+ 5
				S. V. & P.	3.35		S. V. & P.	2.05	+ 63
				Epi.	1.23		Epi.	1.14	+ 8
2½	15	13	2	Body Wt.	185.00	3	Body Wt.	195.00	- 5
				Testes	2.38		Testes	2.25	+ 6
				S. V. & P.	2.58		S. V. & P.	1.06	+143
				Epi.	0.89		Epi.	0.84	+ 20
8	15	17	3	Body Wt.	288.00	3	Body Wt.	239.00	+ 20
				Testes	2.65		Testes	2.52	+ 5
				S. V. & P.	4.09		S. V. & P.	1.16	+253
				Epi.	1.12		Epi.	0.93	+ 20
8	15	31	3	Body Wt.	223.00	3	Body Wt.	243.00	- 8
				Testes	2.60		Testes	2.09	+ 24
				S. V. & P.	3.89		S. V. & P.	0.88	+342
				Epi.	1.22		Epi.	1.10	+ 11
8	15	42	2	Body Wt.	284.00	2	Body Wt.	269.00	+ 6
				Testes	2.78		Testes	1.2	+132
				S. V. & P.	3.17		S. V. & P.	0.31	+922
				Epi.	1.59		Epi.	0.83	+ 91
7	15	49	2	Body Wt.	229.00	1	Body Wt.	227.00	+ 1
				Testes	2.68		Testes	1.83	+ 46
				S. V. & P.	4.26		S. V. & P.	0.78	+446
				Epi.	1.48		Epi.	0.81	+ 82
6	7½	61	2	Body Wt.	240.00	2	Body Wt.	249.00	- 3.6
				Testes	2.68		Testes	2.45	+ 9
				S. V. & P.	2.09		S. V. & P.	2.28	- 8
				Epi.	1.13		Epi.	1.05	+ 8
6	2½	61	3	Body Wt.	244.00	3	Body Wt.	260.00	- 6
				Testes	2.24		Testes	2.53	- 9
				S. V. & P.	1.19		S. V. & P.	1.47	- 19
				Epi.	0.88		Epi.	0.91	- 3.3
8	15	62	3	Body Wt.	249.00	3	Body Wt.	275.00	- 10
				Testes	2.46		Testes	2.17	+ 13
				S. V. & P.	3.03		S. V. & P.	1.44	+110
				Epi.	1.28		Epi.	1.19	+ 9
2½	2½	93	2	Body Wt.	223.00	2	Body Wt.	205.00	+ 9
				Testes	2.51		Testes	2.30	+ 9
				S. V. & P.	1.27		S. V. & P.	1.10	+ 15
				Epi.	0.98		Epi.	0.79	+ 24

TABLE IV.—Similar to Table III, except that adult animals were used. Marked overgrowth of the seminal vesicles and prostate gland, and, to a less extent, of the epididymis, consistently occurs following treatment with this hormone. Prolonged treatment, sixty days or longer, appears to have little effect. This is probably due to regression of the organs in the latter part of the experiment, and is interpreted as an overdosage effect.

TABLE V.

EFFECT OF ANTERIOR-PITUITARY-LIKE HORMONE OF PLACENTA ON CASTRATED MALE RATS

	Experimental Animals				*Control Animals*	
Age	*Amount of Placenta Gms.*	*Duration Days*	*No. of Experiments*	*Average Weights Gms.*	*No. of Controls*	*Average Weights Gms.*
Adult	15	9	2	Body Wt. 192.00 S. V. & P. 0.34	2	Body Wt. 189.00 S. V. & P. 0.39
Adult	10	14	2	Body Wt. 179.00 S. V. & P. 0.15	2	Body Wt. 181.00 S. V. & P. 0.19
Adult	5	23	2	Body Wt. 195.00 S. V. & P. 0.24	2	Body Wt. 194.00 S. V. & P. 0.28
Adult	1	32	2	Body Wt. 207.00 S. V. & P. 0.22	2	Body Wt. 180.00 S. V. & P. 0.15

TABLE V.—Showing absence of effect of the anterior-pituitary-like hormone on castrated male rats.

Table V), and hence it may be concluded that the intact gonad plays an essential part in this reaction. Recent work on the chemistry and physiology of the male hormone[9, 15] indicates, as others have suggested, that the gonad is stimulated as a result of the administration of the placental hormone to liberate male hormone, and that it is the latter which is responsible for the marked growth of the accessory organs which has been observed. The effect of this particular placental extract in this regard stands in sharp contrast to the comparative inactivity in the male of the alcohol-soluble placental hormone,

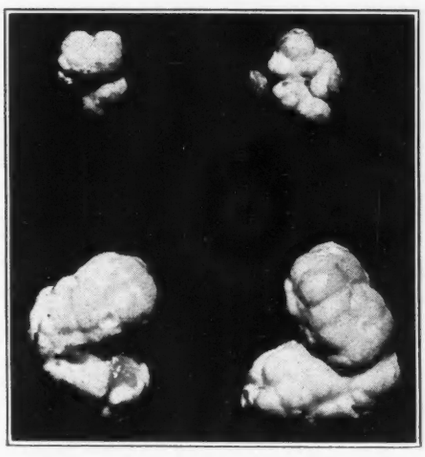


FIG. 3.—Above: Ovaries of litter-mate control rat. Below: ovaries of rat after twelve implantations of fresh rat pituitary gland.

emmenin. It may be noted also that the administration of the Wiesner sulphosalicylic acid extract, or of a crude placental extract (the ether-extracted concentrate of the original acetone extract), both of which presumably contain

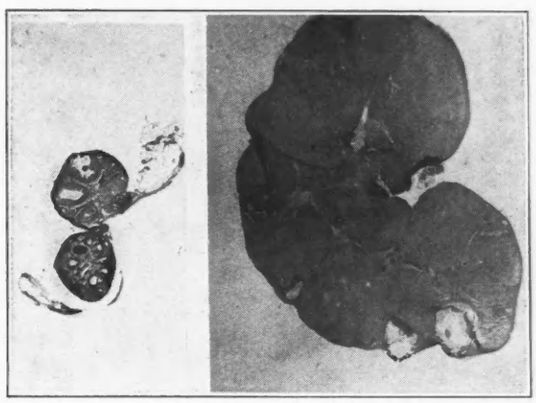


FIG. 4.—Photomicrograph of ovaries shown in the gross in Fig. 3. Note the mass of atretic corpora lutea in the ovary of the experimental animal.

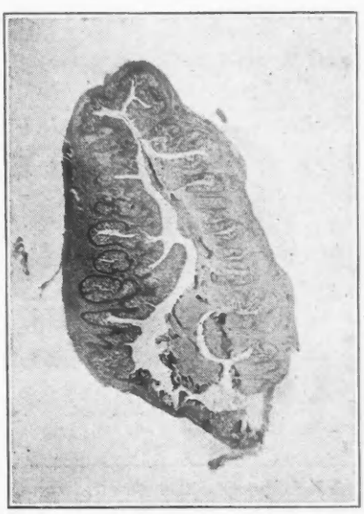


FIG. 5.—Photomicrograph of vagina of experimental animal, ovaries of which are shown in Figs. 3 and 4. Note the marked hypertrophy of the mucous membrane.

TABLE VI.

EFFECT OF ANTERIOR-PITUITARY-LIKE HORMONE ON WEIGHTS OF OVARIES IN RATS

	Experimental Animals					*Control Animals*		
Age Days	*Amount of Placenta Gms.*	*No. of Injections*	*Duration Days*	*No. of Experiments*	*Average Weights Gms.*	*No. of Controls*	*Average Weights Gms.*	*Average Difference Per Cent*
24	20	4	7	2	Body Wt. 54.00 Ovaries 0.025	1	Body Wt. 55.00 Ovaries 0.007	− 1.8 +257
27	0.5	3	7	1	Body Wt. 33.00 Ovaries 0.011	1	Body Wt. 31.00 Ovaries 0.009	+ 6 + 22
27	1.0	3	7	1	Body Wt. 31.00 Ovaries 0.010	1	Body Wt. 31.00 Ovaries 0.009	0 + 12
31	5	4	7	3	Body Wt. 43.00 Ovaries 0.019	1	Body Wt. 45.00 Ovaries 0.016	− 4 + 19
35	7.5	17	20	1	Body Wt. 78.00 Ovaries 0.019	1	Body Wt. 97.00 Ovaries 0.027	− 20 − 30
37	6	4	5	1	Body Wt. 47.00 Ovaries 0.013	2	Body Wt. 61.00 Ovaries 0.010	− 27 + 30
40	25	16	19	1	Body Wt. 86.00 Ovaries 0.052	1	Body Wt. 93.00 Ovaries 0.020	− 7.5 +160
41	12.5	3	6	2	Body Wt. 54.00 Ovaries 0.019	1	Body Wt. 71.00 Ovaries 0.014	− 31 + 21
45	5	9	10	3	Body Wt. 77.00 Ovaries 0.039	2	Body Wt. 89.00 Ovaries 0.016	− 13* +144
45	16	22	26	2	Body Wt. 106.00 Ovaries 0.040	2	Body Wt. 102.00 Ovaries 0.039	+ 4 + 2.6
52	25	31	37	1	Body Wt. 125.00 Ovaries 0.056	1	Body Wt. 141.00 Ovaries 0.062	− 11 − 9.7
	2.5	21	25	1	Body Wt. 112.00 Ovaries 0.049	1	Body Wt. 123.00 Ovaries 0.056	− 8.9 − 13
68	2.5	37	44	2	Body Wt. 135.00 Ovaries 0.053	2	Body Wt. 143.00 Ovaries 0.046	− 5.9 + 15
Mos. 4½	25	7	7	2	Body Wt. 163.00 Ovaries 0.029	2	Body Wt. 173.00 Ovaries 0.044	− 5.8 + 34
4½	25	11	12	1	Body Wt. 149.00 Ovaries 0.056	2	Body Wt. 166.00 Ovaries 0.056	− 11 0
10	25	17	20	2	Body Wt. 175.00 Ovaries 0.058	2	Body Wt. 192.00 Ovaries 0.055	− 9.7 + 5.5
10	25	23	27	1	Body Wt. 144.00 Ovaries 0.049	1	Body Wt. 158.00 Ovaries 0.034	
10	25	23	27	1	Body Wt. 144.00 Ovaries 0.028	1	Body Wt. 151.00 Ovaries 0.016	− 4.5 +196
10	25	23	27	1	Body Wt. 155.00 Ovaries 0.145			
Adult	5	63	75	1	Body Wt. 185.00 Ovaries 0.070	1	Body Wt. 193.00 Ovaries 0.098	− 4.1 − 29
Adult	5	120	131	3	Body Wt. Ovaries 0.099	1	Body Wt. Ovaries 0.041	 +141

TABLE VI.—Showing the effect of the anterior-pituitary-like hormone of the placenta upon the growth of the ovaries. Note that the acceleration in rate of growth is largely confined to young animals and seldom does growth to a point beyond normal adult size occur. Old adult females may develop cystic ovaries, with or without treatment, and such ovaries may weigh over 100 mg. The ovaries of normal young adult rats weigh under 70 mg. in our experience.

*Hysterectomy on this group.

TABLE VII.

IMMATURE MALE RATS (21-33 DAYS OLD) IMPLANTED INTRAMUSCULARLY WITH FRESH RAT PITUITARY GLANDS

Age Days	*Dose No. of Glands Per Day*	*Duration Days*	*No. of Experiments*	*Average Weights of Experiments Gms.*		*No. of Controls*	*Average Weights of Controls Gms.*		*Average Difference Per Cent*
21	1	5	1	Body Wt.	23.00	1	Body Wt.	24.00	- 4
				Testes	0.22		Testes	0.17	+ 29.5
				S. V. & P.	0.07		S. V. & P.	0.04	+ 75
				Epi.	0.04		Epi.	0.02	+100
20	1	8	1	Body Wt.	25.00	1	Body Wt.	35.00	- 29
				Testes	0.32		Testes	0.18	+ 78
				S. V. & P.	0.07		S. V. & P.	0.03	+133.5
				Epi.	0.05		Epi.	0.03	+ 67
21	1	8	1	Body Wt.	24.00	1	Body Wt.	35.00	- 32
				Testes	0.30		Testes	0.18	+ 67
				S. V. & P.	0.07		S. V. & P.	0.03	+133.5
				Epi.	0.04		Epi.	0.03	+ 33.5
21	1	10	1	Body Wt.	27.00	1	Body Wt.	35.00	- 23
				Testes	0.46		Testes	0.18	+155.5
				S. V. & P.	0.14		S. V. & P.	0.03	+367
				Epi.	0.09		Epi.	0.03	+200
30	1	14	3	Body Wt.	70.00	2	Body Wt.	84.00	- 17
				Testes	0.97		Testes	0.75	+ 29
				S. V. & P.	0.34		S. V. & P.	0.12	+183
				Epi.	0.20		Epi.	0.12	+ 67
33	1	20	1	Body Wt.	125.00	1	Body Wt.	98.00	+ 28
				Testes	1.90		Testes	1.72	+ 10
				S. V. & P.	0.45		S. V. & P.	0.27	+ 35
				Epi.	0.31		Epi.	0.23	+ 35
33	1	22	3	Body Wt.	103.00	2	Body Wt.	87.00	+ 18
				Testes	1.82		Testes	1.34	+ 36
				S. V. & P.	0.56		S. V. & P.	0.16	+250
				Epi.	0.35		Epi.	0.22	+ 59

TABLE VII.—Showing the effect of the fresh pituitary implant upon young male rats. Note the consistent growth effect upon the testes as well as the accessory glands.

emmenin as well as the anterior-pituitary-like principle, produces effects analogous to those of the more purified preparation of the second placental principle (see Tables I and II).

The effect of various dosages, for varying times, of the anterior-pituitary-like principle on the growth of the ovaries of experimental rats is shown in Table VI. It is of some significance that the ovaries of young animals so treated do not, as a rule, increase in size to such an extent that they become larger than those of normal adults. Moreover, normal adult females which have received intensive treatment with these extracts do not usually show hypertrophy of the ovaries.

For comparison with these results, the effect of daily intramuscular implants of fresh rat pituitary glands, into both male and female rats, is shown in Tables VII, VIII and IX. The effect of such treatment, as has been shown in the first instance by Zondek and Aschheim[17] and Smith and Engle,[16] on the weight as well as upon the histological appearance of the ovaries is truly remarkable (See Figs. 3 and 4). As regards this particular effect, we have never been able to see anything approaching it with placental extracts as used in these experiments. One may, however, produce a considerable enlargement of the ovaries of the immature rat by injections of pregnancy urine,[11] or of extracts, such as "Prolan", prepared therefrom by precipitation with alcohol.[19, 8]

The difference in the growth effect upon the male gonad after treatment with the placental hormone and pituitary implants respectively is not so striking as in the case of the ovary. Young animals show a greater response to pituitary implants than adults do; it is not unlikely that this is a matter of dosage, and the experiments on adult animals are being extended

TABLE VIII.

EFFECT OF INTRAMUSCULAR IMPLANTATION OF FRESH RAT PITUITARY ON WEIGHT OF OVARIES

	Experimental Animals					*Control Animals*		
Age Days	*No. of Injections*	*Duration Days*	*Cycle*	*No. of Experiments*	*Average Weights Gms.*	*No. of Controls*	*Average Weights Gms.*	*Average Difference Per Cent*
22	6	8	1st	1	Body Wt. 26.00 Ovaries 0.007	1	Body Wt. 26.00 Ovaries 0.009	0 - 22
33	3	4	1st	1	Body Wt. 52.00 Ovaries 0.036	1	Body Wt. 49.00 Ovaries 0.014	+ 6.1 +157
33	5	7	2nd	1	Body Wt. 63.00 Ovaries 0.083	1	Body Wt. 64.00 Ovaries 0.008	- 1.5 +937
33	13	15	Cont'd. Epi. Flush	1	Body Wt. 62.00 Ovaries 0.014			
33	13	15	Irreg.	1	Body Wt. 66.00 Ovaries 0.132	1	Body Wt. 62.00 Ovaries 0.009	
33	13	15	Irreg.	1	Body Wt. 59.00 Ovaries 0.109	1	Body Wt. 65.00 Ovaries 0.006	- 15 +971
33	13	15	Irreg.	1	Body Wt. 55.00 Ovaries 0.047	1	Body Wt. 59.00 Ovaries 0.006	
34	12	15	1 Cycle only	2	Body Wt. 65.00 Ovaries 0.118	1	Body Wt. 77.00 Ovaries 0.017	- 15 +594
Mos. 6½	5	5	Regular	1	Body Wt. 192.00 Ovaries 0.042	1	Body Wt. 182.00 Ovaries 0.046	+ 5 5 - 9
7	9	11	1 Reg. 1 Irreg.	2	Body Wt. 142.00 Ovaries 0.057	1	Body Wt. 142.00 Ovaries 0.019	0 +200

TABLE VIII.—Fresh rat pituitary implants into immature female rats. Note the enormous and speedy hypertrophy of the ovaries in marked contrast to the effect of the placental principle (Table VI.).

TABLE IX.

ADULT MALE RATS IMPLANTED INTRAMUSCULARLY WITH FRESH RAT PITUITARY GLANDS

	Experimental Animals				*Control Animals*		
Age Mos.	*No. of Injections*	*Duration Days*	*No. of Experiments*	*Weights of Exp. Animals Gms.*	*No. of Controls*	*Weights of Controls Gms.*	*Average Difference Per Cent*
5	16	21	1	Body Wt. 216.00 Testes 3.05 S. V. & P. 2.47 Epi. 1.33	1	Body Wt. 225.00 Testes 2.77 S. V. & P. 1.32 Epi. 1.21	- 4 + 10 + 87 + 9
6	22	30	1	Body Wt. 248.00 Testes 2.67 S. V. & P. 2.88 Epi. 1.24	1	Body Wt. 245.00 Testes 2.77 S. V. & P. 1.60 Epi. 1.26	- 1 - 4 + 80 - 2
6	23	30	2	Body Wt. 260.00 Testes 3.03 S. V. & P. 1.95 Epi. 1.37	2	Body Wt. 260.00 Testes 2.81 S. V. & P. 1.44 Epi. 1.35	0 + 8 + 35 + 1
6	23	30	2	Body Wt. 217.00 Testes 2.36 S. V. & P. 1.81 Epi. 1.13	2	Body Wt. 240.00 Testes 2.34 S. V. & P. 1.35 Epi. 1.05	- 9.5 + 1 + 34 + 8

TABLE IX.—Showing effect of fresh rat pituitary implants into adult male rats.

TABLE X.
AVERAGE PERCENTAGE EFFECT OF EXPERIMENTS ON WEIGHT OF GENITAL ORGANS

Chart No.	*Type of Animal*	*Treatment*	*No. of Expts.*	*Body Weight*	*Testis Weight*	*S. V. & P. Weight*
i	Male, immature	Wiesner extract	31	−12 ±2.5	−11 ±1.0	+120 ±13
ii	" "	Crude extract	9	−30 ±5.5	−26 ±12	+400 ±90
iii	" "	Purified extract	23	− 5 ±1.5	− 6 ±2.5	+ 60 ±8.5
vii	" "	Implants	11	− 8 ±6.6	+49 ±12	+166 ±68
iv	" mature	Purified extract	24	+ 1 ±2.0	+21 ±7.5	+220 ±60
ix	" "	Implants	6	− 4 ±1.8	+ 4 ±2.3	+ 51 ±10
					Ovary Weight	
vi	Female	Purified extracts	34	− 8 ±1.7	+68 ±15	
viii	"	Implants	12	− 7 ±2.6	+545 ±116	

TABLE X.—Showing in summary the mean percentage difference in body weights and organ weights between the experimental animals and their litter-mate controls, averaged for each series without taking account of varying dosage. The mean errors of the means are also given.

to discover if this is the case. Increased growth of the immature testis has also been reported by various workers using pregnancy urine;[2, 3, 19] but Evans and Simpson[12] report that the testis of the adult may be diminished by injections of alkaline extract of the anterior pituitary.

Since the experiments detailed herein were begun, considerable progress has been made in the further purification of these extracts, especially by salting out with ammonium sulphate (a method utilized by Dickens[8] in his fractionation of pregnancy urine), and studies of the physiological properties of this purified preparation are in progress. When 18 to 21 day old female rats, as used for assay, are treated for two or three days with anterior-pituitary-like hormone, and the vaginal smears are followed, an œstrus flush of cornified epithelial cells on the fourth or fifth day is succeeded by a period of quiescence until cyclic activity of the ovaries begins spontaneously (similar results are also obtainable with the emmenin fraction). On the other hand, if the injections, even in massive doses, are continued, the first cycle is followed in three or four days by a second, and so on.

The fact established in this paper that the effect upon the weight of the ovaries of small implants of rat pituitary is far greater than the effect of our placental extracts, even in quantities equivalent to 32 grams of placenta, may be interpreted either as a matter of dosage or as due to the absence of some specific growth-promoting effect from the latter material. Some evidence that the second alternative is preferable is furnished by the experiments on males, especially on immature males, where comparable increases in the weight of seminal vesicles and prostate glands were obtained by both methods of treatment, but the increase in testis weight produced by implants could not be demonstrated by the use of placental extracts.

The suggestion[6] that the placenta of the primates contains hormones absent in lower orders is borne out by our failure to obtain active extracts from dog placentæ, or any evidence of activity of implants of rat placentæ. We do not regard the experiments of Mirskaia[14] on mouse placentæ as entirely convincing. Mention should be made, however, of the work of Cole and Hart,[5] who showed that "anterior pituitary" hormone was present in the blood serum of mares during part of the gestation period. We are nevertheless inclined to believe that the placenta has acquired new endocrine functions in the primate, and for this reason a series of experiments on monkeys are being carried on. Particular interest may attach to these in view of the remarkable results recently reported by Hartmann and his collaborators.[13]

It may be noted here that the clinical study of the anterior-pituitary-like hormone of the human placenta[4] is being continued in collaboration with the Departments of Medicine and of Gynæcology and Obstetrics of McGill University.

SUMMARY

Methods of preparing extracts of human placentæ containing an alcohol-insoluble principle are described. The effect of such extracts on the growth and weight of the ovaries, testes, seminal vesicles, prostates, and epididymes of immature and adult rats are noted and compared with the effects obtained by implantation of pituitary glands.

We wish to acknowledge our indebtedness to Mr. E. Rossiter for financial assistance, and to Prof. F. E. Lloyd for his assistance in obtaining the photomicrographs.

REFERENCES

1. BIEDL, *Endokrinol.*, 1928, **2:** 241.
2. BOTSCHKAREFF, *Klin. Wchnschr.*, 1929, **8:** 1718.
3. BROUHA AND SIMONNET, *Comptes Rendus. Soc. Biol.*, 1930, **103:** 558.
4. CAMPBELL AND COLLIP, *Canad. M. Ass. J.*, 1930, **23:** 633, and *Brit. M. J.*, 1930, **2:** 1081.
5. COLE AND HART, *Am. J. Physiol.*, 1930, **93:** 57.
6. COLLIP, *Canad. M. Ass. J.*, 1930. **22:** 761.
7. COLLIP, *Ibid.*, 1930, **23:** 631; and *Brit. M. J.*, 1930, **2:** 1080.
8. DICKENS, *Biochem. J.*, 1930, **24:** 1507.
9. DODDS, GREENWOOD, ALLAN AND GALLIMORE, *Ibid.*, 1930, **24:** 1031.
10. ENGLE, *Anat. Rec.*, 1929, **43:** 187.
11. EVANS AND SIMPSON, *Am. J. Physiol.*, 1929, **89:** 371.
12. EVANS AND SIMPSON, *J. Am. M. Ass.*, 1929, **91:** 1337.
13. HARTMANN, FIROR AND GEILING, *Am. J. Physiol.*, 1930, **95:** 662.
14. MIRSKAIA, *Proc. Roy. Soc. Edinb.*, 1930, **50:** 104.
15. MOORE AND GALLAGHER, *Am. J. Physiol.*, 1929, **89:** 388.
16. SMITH AND ENGLE, *Am. J. Anat.*, 1927, **40:** 159.
17. ZONDEK AND ASCHHEIM, *Zeitschr. f. Geburts. u. Gynäkol.*, 1926, **90:** 378, 391.
18. ZONDEK AND ASCHHEIM, *Klin. Wchnschr.*, 1928, **7:** 831.
19. ZONDEK, *Zeitschr. f. Geburts. u. Gynäkol.*, 1929, **95:** 361.

THE INCORPORATION OF VITAMINS IN BREAD*

BY FREDERICK F. TISDALL, M.D., T. G. H. DRAKE, M.B., AND ALAN BROWN, M.B.,

Toronto

WITHIN recent years, and with increasing force, it has been borne in upon the medical profession that vitamins are essential for life. The experimental work forming the basis of this report has been carried on since 1929 and deals chiefly with the incorporation of vitamins B1, D and E in bread.

The recent work of Morgan and Barry[1] has emphasized a possible deficiency of vitamin B1 in the modern diet. A lack of this vitamin results in a lessened desire for food and diminished growth in children, a lowered resistance against infection and, as is well known, the development of polyneuritis. In regard to vitamin E, we do not understand fully its significance in human metabolism, but, working with animals, this vitamin has been found to play an important rôle in reproduction. Both vitamins are found in large amounts in wheat germ.

The relationship of vitamin D to the prevention and cure of rickets is universally acknowledged. However, the importance of this vitamin in the maintenance of normal human metabolism is not so widely recognized. Calcium and phosphorus metabolism cannot be carried on with optimal efficiency by the body without vitamin D. The importance of this, not only during the period of growth but also during the periods of pregnancy and lactation should not be overlooked. Certain diseases, such as tetany and osteomalacia, can be prevented by the regular administration of this vitamin.[2] The work of May Mellanby has emphasized the importance of vitamin D in the prevention of dental caries,[3] and Robertson and Ross,[4] working with animals, have shown that the administration of this vitamin increases resistance against disease. From these and other observations it is evident that vitamin D is essential for normal metabolism, not only during childhood but probably throughout the whole of life. No other vitamin is so sparsely distributed in food as is vitamin D.[5] Cod-liver oil and egg yolk are the only commonly used food substances which can be relied upon to furnish appreciable amounts of this vitamin. Milk may contain a measurable quantity of D, depending on the diet of the cow.[6] However, pædiatricians are in general agreement that the vitamin D content of milk is negligible. Cod-liver oil is usually not regarded as a food. This leaves egg yolk as the only commonly used food substance which contains vitamin D in appreciable amounts.

* From the Nutritional Research Laboratories of the Hospital for Sick Children, Toronto, and the Department of Pædiatrics, University of Toronto.

The chief source of vitamin D for the human race is sunshine and skyshine. The shorter ultra-violet rays in sunshine and in the reflected rays from the sky act on minute traces of ergosterol in the human skin and activate or transform it into vitamin D. Unfortunately these short ultra-violet rays are markedly diminished by any smoke, dust and moisture in the atmosphere. They are also greatly reduced when the sun is low in the sky. Tisdall and Brown[7] found winter sunshine to be only one-eighth as potent as summer sunshine. They also found in the northern half of the United States and in Canada that this period of lowered potency extends from the middle of October to the middle of February. This, combined with our indoor winter life and the necessity of bundling up with winter clothes when we are outside, means that a large percentage of the people in the temperate zones obtain very little vitamin D through sunshine and skyshine for from three to six months of the year. In fact, even in the summer months, many people in the larger urban centres who are in offices or factories all day probably do not receive sufficient sunshine. From a survey of the foregoing facts it is evident that an additional general source of vitamin D should be of value to the population at large.

In 1924, it was shown coincidently by Steenbock[8] and Hess[9] that exposure of certain foods to the ultra-violet rays of the mercury vapour quartz lamp imparted antirachitic properties to these foods. Later, it was shown by Hess and Windaus[10] in the United States and Rosenheim and Webster[11] in England that this remarkable result was due to the presence in the foods of minute traces of ergosterol, which, as already stated, when acted upon by ultra-violet rays are transformed into vitamin D.

During the past year the incorporation of vitamins in bread has been investigated in this laboratory. On account of the deleterious effect of heat on vitamins we determined the maximum temperature in bread during baking, and found it invariably below 212° F., due, no doubt, to the moisture in the dough and the insulating action of the crust. This temperature, over the short baking period, has no damaging effect on the vitamins under consideration. We also found bread to have a

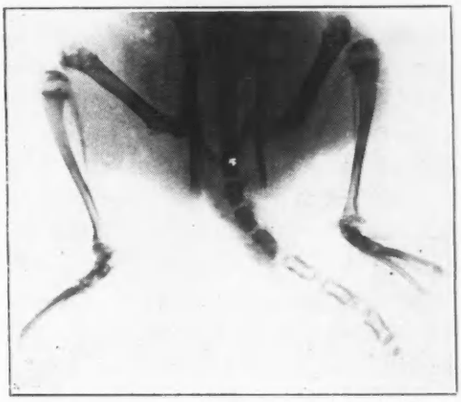


FIG. 1.—A rat fed on Steenbock's rickets-producing diet. Blood phosphorus 1.1 mgm. per 100 c.c.; percentage of ash in the bones, 30.8.

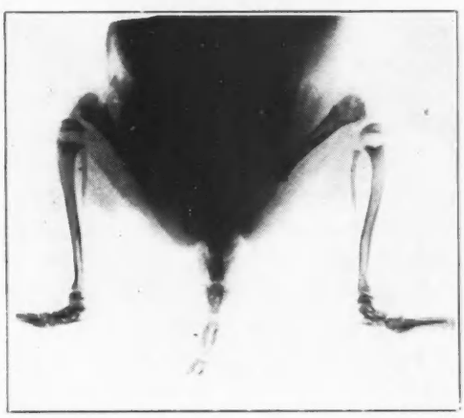


FIG. 2.—A rat fed on Steenbock's rickets-producing diet containing 20 per cent of ordinary white bread. Blood phosphorus 2.0 mgm. per 100 c.c.; percentage of ash in the bones, 30.1.

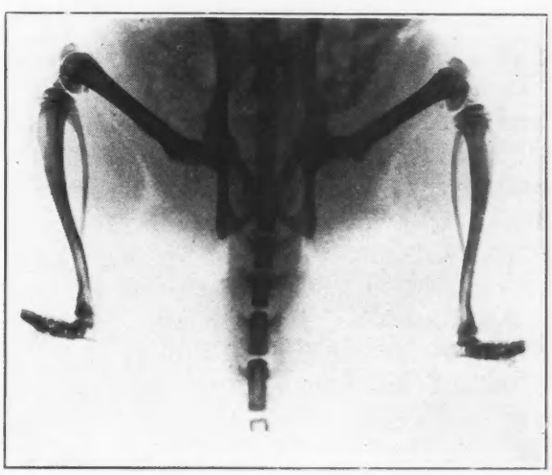


FIG. 3.—A rat fed on Steenbock's rickets-producing diet containing 20 per cent vitamin D bread. Blood phosphorus 4.6 mgm. per 100 c.c.; percentage of ash in the bones, 49.5.

slightly acid reaction which is favourable for vitamin preservation.

As over 85 per cent of all bread consumed in Canada and the United States is white bread, it is obvious that this type of bread must be utilized as a vitamin carrier if the added vitamins are to reach the majority of the population. We have added vitamin D to white bread by four different methods: (1) The white flour was irradiated, but the desired potency could not be obtained by this procedure; (2) wheat germ with its higher ergosterol content was irradiated and mixed with flour; the resultant loaf was quite potent in vitamin D; (3) dried yeast with its extremely high ergosterol content was irradiated so that its vitamin D potency was from 50 to 100 times that of cod-liver oil, and mixed in the dough in small amounts, thereby adding vitamin D; (4) ergosterol itself was irradiated, mixed with the shortening (vegetable oil or lard) and in this vehicle was incorporated in the bread. The presence of vitamin D in the final baked loaves was biologically determined by the procedure employed in this laboratory for the past five years.[12] (See Figs. 1, 2 and 3).

White flour has an ergosterol content of approximately one part in 10,000,000 parts of flour. The difficulty and cost of irradiating this tremendous amount of material, either as whiteflour or dough, in order to activate the one part of ergosterol, is such as to make this method of introducing vitamin D into bread impractical. Again, the cost of irradiating the wheat germ and the yeast would increase the cost of the bread to the consuming public. On the other hand, the cost of irradiating the ergosterol and incorporating it into bread by dissolving it in the shortening is so low that bread can be produced with a vitamin D content equivalent to that of three teaspoonfuls of cod-liver oil per loaf at no extra cost to the public. In addition, the vitamin D potency can be standardized in the shortening. In this way the desired amount of vitamin D can be secured in each loaf and an absolutely uniform product be obtained. It should be distinctly understood, however, that in the case of infants and young children, with their small bread consumption and very large vitamin D requirements, cod-liver oil or viosterol should still be given.

Vitamins B1 and E were successfully introduced in bread by the addition of wheat germ. When 5 per cent of the flour was replaced by wheat germ the resultant loaf could hardly be detected in appearance from ordinary white bread, and, in addition, it had a singularly pleasing flavour. By the further addition of irradiated ergosterol a white loaf was obtained which contained appreciable amounts of vitamins B1, D and E.

Bread is consumed in large amounts by the wage-earning class. In a survey of the consumption of bread in a large city, it was found that about one-eighth of a loaf per person per day was consumed in the well-to-do families, while in the poorer sections of the city the average consumption was from one-half to one loaf per person per day. The reason for this is that bread is the cheapest form of food. It is reasonable to conclude, therefore, that bread is a particularly valuable food in which to make vitamins available, not only on account of its universal distribution but because it is so largely consumed by those who frequently cannot afford to buy the more expensive vitamin-containing foods.

Conclusions

1. Vitamins are essential for normal human metabolism.

2. The refined grain products which bulk so largely in the modern diet are deficient in vitamins.

3. An additional general supply of vitamins B1 and E may be made available by incorporating wheat germ in bread.

4. An additional general supply of vitamin D may be made available by incorporating it in bread. The vitamin D does not change in any way the appearance or taste of the bread. This procedure, either alone or with the addition of the wheat germ, can be utilized at no additional cost to the consumer.

5. In regard to vitamin D, egg yolk is the only commonly used food substance which contains this vitamin in appreciable amounts, the chief source being sunshine and skyshine. A large percentage of the population of Canada and the United States obtain very little vitamin D through sunshine and skyshine for from three to six months of the year. Many people, on account of present day conditions, do not receive sufficient sunshine even in the summer months.

6. Bread is a particularly suitable carrier for vitamins on account of its universal distribution and its large consumption by the wage-earning class, who frequently cannot afford to buy the more expensive vitamin containing foods.

REFERENCES

1. MORGAN AND BARRY, *Am. J. Dis. Child.*, 1930, **39:** 935.
2. HESS, Rickets, Osteomalacia and Tetany, Philadelphia, Lea and Febiger, 1929.
3. MELLANBY, *Physiol. Reviews*, 1928, **8:** 545.
4. ROBERTSON AND ROSS, *Proc. Soc. Exper. Biol. & Med.*, 1930, **27:** 999.
5. BLUNT AND COWAN, Ultraviolet Light and Vitamin D in Nutrition, Chicago, University of Chicago Press, 1930.
6. LUCE, *Biochem. J.*, 1924, **18:** 1279.
   STEENBOCK, HART, RUSING, HOPPERT, BASHEROV AND HUMPHREY, *J. Biol. Chem.*, 1930, **87:** 103.
7. TISDALL AND BROWN, *Am. J. Dis. Child.*, 1928, **36:** 734.
8. STEENBOCK AND BLACK, *J. Biol. Chem.*, **61:** 405.
9. HESS, Abstr. *Am. J. Dis. Child.*, 1924, **28:** 517.
10. HESS AND WINDAUS, *Proc. Soc. Exper. Biol. & Med.*, 1927, **24:** 461.
11. ROSENHEIM AND WEBSTER, *Biochem. J.*, 1927, **21:** 389.
12. TISDALL AND BROWN, *Am. J. Dis. Child.*, 1927, **34:** 721.

UROSELECTAN FOR INTRAVENOUS PYELOGRAPHY*

BY J. C. McCLELLAND, M.D.,

Toronto

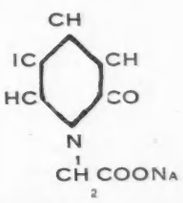
INTRAVENOUS pyelography was attempted as far back as 1905 by Voelcker and Von Lichtenberg, who used colloidal heavy metals, but these were found to be too toxic and had to be abandoned. The first results of intravenous pyelography were obtained by Rowntree and his associates with sodium iodide. They proved that intravenous urography was possible, but that a proper substance must be found. Rosenstein and Von Lichtenberg used sodium iodide intravenously and supplemented it with pneumoradiography, but without success. The ureters in animals were ligated by Lenarduzzi and Pecco, but this method was not practical. Rosenow had the first clinical success with a urea-iodine combination called "pyelognost." His method was improved upon by Ziegler and Koehler, using external compression of the ureters. The elimination of the contrast substance was slow. It was not tolerated by all and was not seen in all cases.

Selectan neutral, synthetized by Professor Binz of the Chemical Institute of the Agricultural College in Berlin, was used by several workers, including, Hryntschak, of Vienna, Lichtwitz, of Altona, Von Lichtenberg and Swick of Berlin. No pronounced clinical success was obtained until Professor Binz synthetized uroselectan, which apparently meets all demands.

* Read before the Academy of Medicine, Toronto, October 28, 1930.

PROPERTIES

Uroselectan is a derivative of pyridine, with 42 per cent iodine in chemical combination. It is the sodium salt of 2 oxy–5 iodopyridin–N–acetic acid with the formula



It is readily soluble, non-toxic and is eliminated by the kidneys in sufficient concentration to give an outline of the urinary passages. The large quantity of iodine is organically combined and the drug passes through without the separation of any of the iodine.

The amount of uroselectan eliminated is dependent on the kidney function. Thus a good picture means good kidney function; a delayed picture means delayed function. The permeation of the kidney parenchyma with this substance gives a denser kidney shadow. The concentration of the uroselectan elimination is about 5 per cent, and will not give so intense a picture as the 12 per cent sodium iodide used in instrumental pyelography. Uroselectan may be injected through a catheter for a retrograde pyelogram, but requires a 15 to 20 per cent solution to give as dense a picture as the sodium

iodide. Thus one cannot expect a very clear picture with the amount excreted by the kidneys. Stronger pictures are seen in the presence of any obstruction, when a greater concentration of the medium is obtained. Severe bilateral parenchymal lesions give very poor pictures which are very much delayed. The filling of the pelvis and ureters is during diastole and no picture is obtained in systole.

Uroselectan is eliminated by the glomeruli. In pronounced glomerular damage no picture is obtained, or a very poor one; this is best seen in parenchymatous kidney infections. When one has tubular kidney damage, as in retention, very good pictures are obtained.

The blood clotting time and sedimentation time are not interfered with. There is no danger of thrombosis or emboli. In 700 cases of

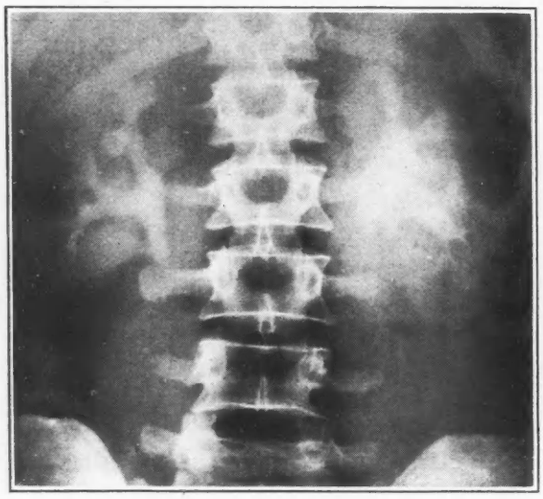


FIG. 1.—A 45 minute uroselectan pyelogram. This patient weighed 190 lbs.

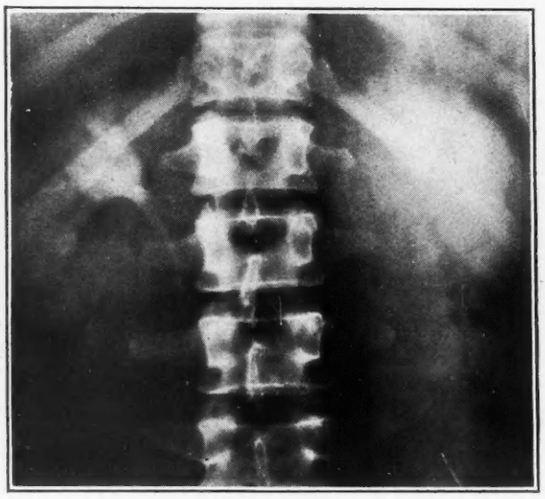


FIG. 2.—A 45 minute uroselectan pyelogram. This patient complained of left-sided kidney pain. It had been impossible to catheterize the left kidney. The right kidney pelvis is normal. The left shows the outline of a sac which represents the kidney pelvis in a pyonephrosis. Left nephrectomy was successfully done.

FIG. 3(a).—Instrumental pyelogram. A stone in the right ureter at the 4th right transverse process obstructs the ureteral catheter. No sodium iodide flowed beyond the calculus to outline the kidney pelvis.

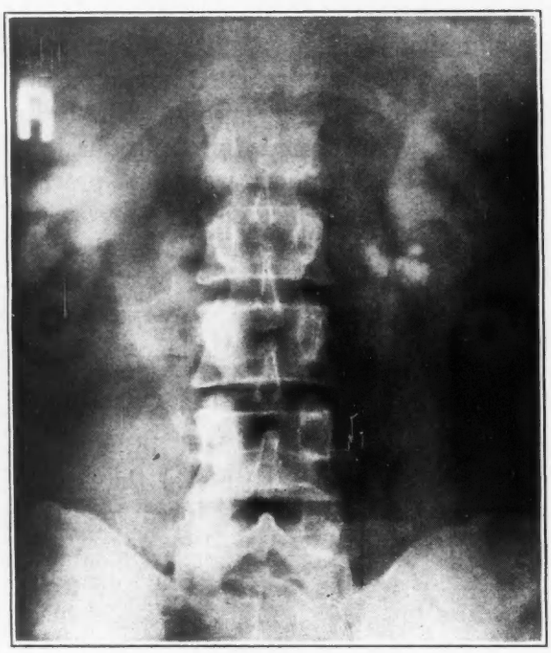


FIG. 3(b).—A 45 minute uroselectan pyelogram. The right kidney pelvis shows a moderate degree of hydronephrosis. The ureter is dilated down to the position of the calculus.

Lichtenberg's* thrombosis occurred 8 times and was said to be due to injury of the intima.

* Communication to the American Urological Association, New York, June, 1930.

METHOD OF ADMINISTRATION

Forty grams of uroselectan powder are dissolved in 110 c.c. of water. The solution is filtered twice and placed in the autoclave for

FIG. 4(a).—An instrumental pyelogram. The right kidney alone is outlined. This patient suffered from severe right kidney pain and a diagnosis of ureteral stricture was made.

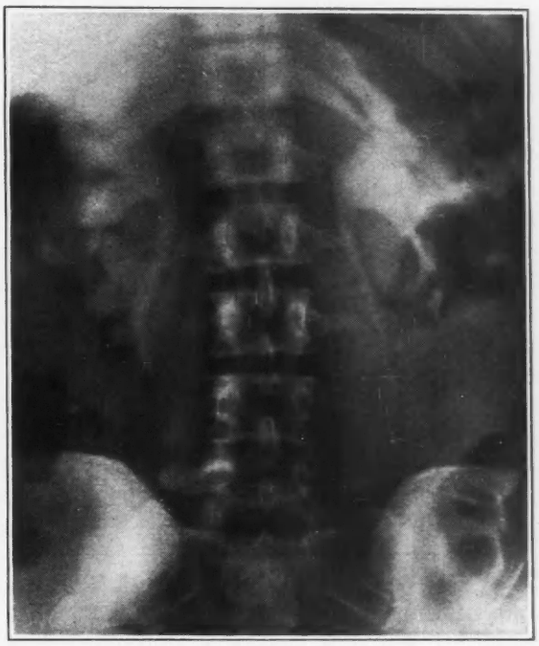


FIG. 4(b).—A 45 minute uroselectan pyelogram. Slight dilatation of the right kidney pelvis and ureter is shown. The position of the stricture was at the lower end of the ureter.

FIG. 5(a).—An instrumental pyelogram. Stricture in lower end of the ureter prevented the catheter or sodium iodide from going up.

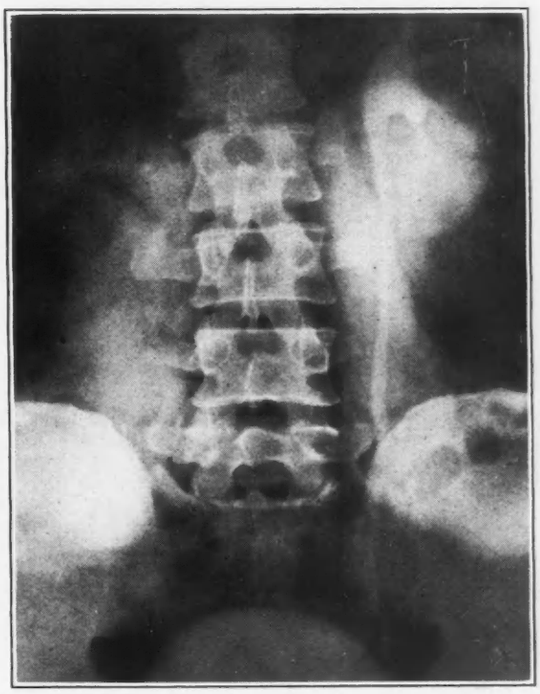


FIG. 5(b).—A 45 minute uroselectan pyelogram. The right kidney pelvis is not outlined, even though the left is clearly seen. This strongly suggested a destroyed right kidney. See Fig. 5(c).

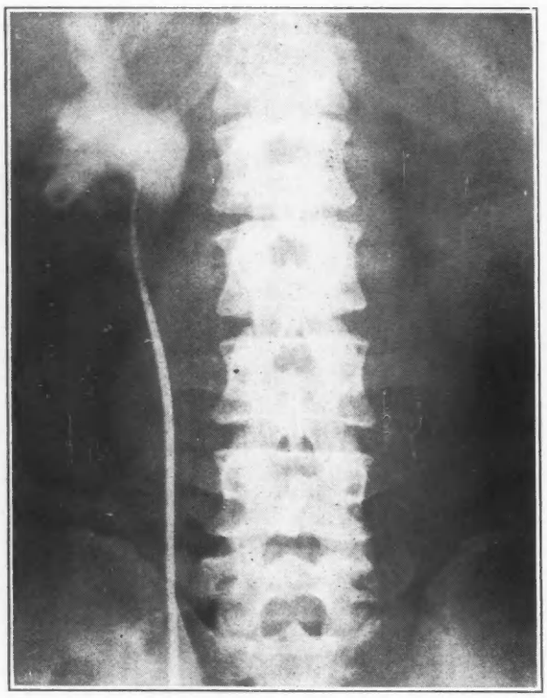


FIG. 5(c).—An instrumental pyelogram. Under anæsthesia the right ureteral stricture was dilated and a Garceau catheter passed. This showed a slight degree of hydronephrosis in a good kidney.

FIG. 6(a).—A pyelogram, using 2½ per cent sodium iodide. The ureters have patent openings to the bladder and the sodium iodide flowed up to give an outline of the ureters and kidney pelves. Several small diverticula are seen in the bladder.

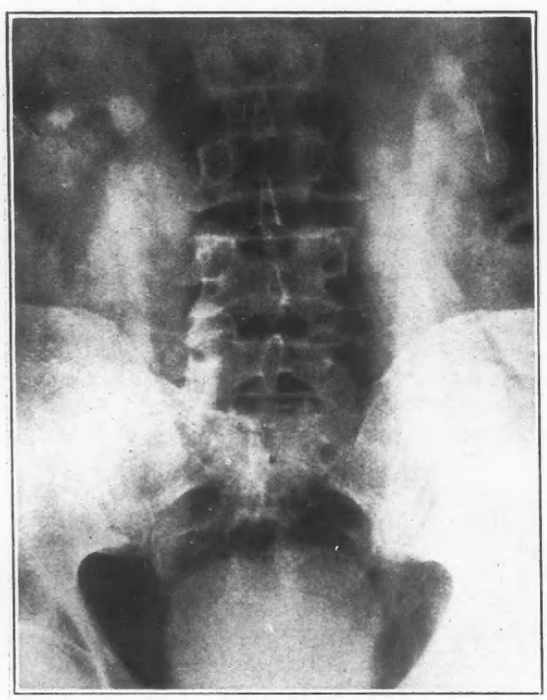


FIG. 6(b).—A 30 minute uroselectan pyelogram. The outlines are less intense than with the sodium iodide. This patient had an intense frequency, due to a good deal of infection, which was greatly relieved for 24 hours after the uroselectan. This suggests that it has antiseptic properties.

FIG. 7(a).—A plain plate. Several stones are shown in the lower end of the right ureter.

Fig. 7(b).—A 45 minute uroselectan pyelogram. This localizes the shadows as being in the right ureter. Cystoscopy was not necessary.

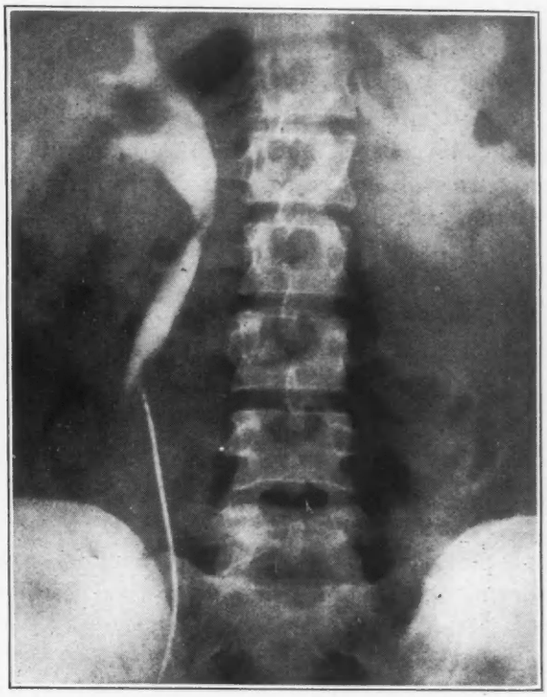


Fig. 8(a).—A right instrumental pyelogram. At cystoscopy no left ureteral orifice could be seen. This confirmed a similar observation five years before, when the absence of the left kidney was suspected.

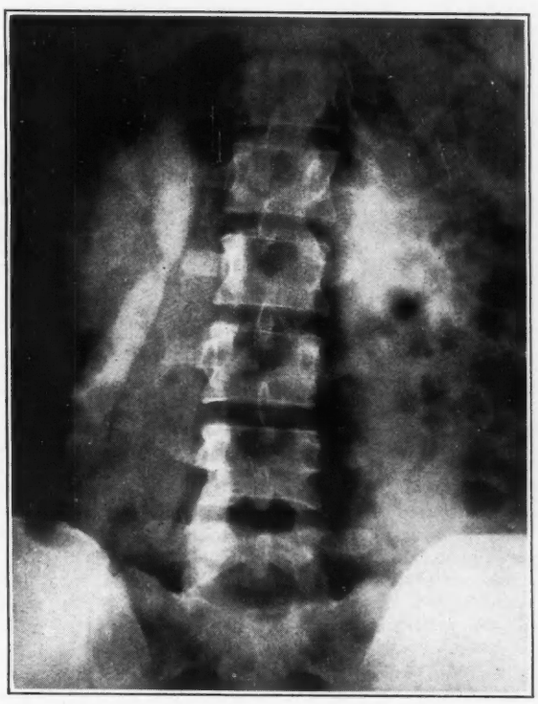


Fig. 8(b).—A 45 minute uroselectan pyelogram. The right kidney pelvis and ureter are seen, but the left kidney pelvis was not outlined. Congenital absence of the left kidney.

Fig. 9.—The left kidney area contains a calcified mass. This is a tuberculous autonephrectomy. The calyces of the right kidney are dilated. They have a smooth outline in contrast to the moth-eaten appearance of tuberculous cavitation. The ureter is slightly dilated and tortuous. Several attempts had been made to catheterize these ureters during the past seven years without success. Uroselectan has made it possible to outline the right kidney pelvis. It is possible that the right kidney is tuberculous also.

15 minutes at 15 pounds pressure. It is cooled and administered intravenously by allowing it to run in from a reservoir. The rate of flow is regulated, and about ten minutes is taken to run in the 100 c.c. of solution The patients are given an ounce of castor oil to thoroughly clean out the gastrointestinal tract and water is restricted the morning the uroselectan is used.

RESULTS

Roentgenograms are taken at intervals of 15 minutes, 45 minutes and 75 minutes after the intravenous administration of the uroselectan. In this series the majority of the best plates are obtained at the 45-minute interval. Figures 1 to 9 show some of the results. Each figure represents the roentgenograms from one patient obtained by a different method, such as uroselectan and instrumental pyelograms. It will be seen that enough information is obtained from the series (a) and (b) to enable one to make a complete diagnosis.*

Here we may insert the warning sounded by Dr. Rudolph Chivalla of Vienna (*Brit. J. Urol.*, Sept., 1930), which he gives as to "its employment alone for diagnosis, and more particularly for operative indications, especially in the hands of the urologically untrained."

CONCLUSIONS

1. The pyelograms with uroselectan are not so sharply defined as with sodium iodide.
2. Uroselectan will outline a pelvis and ureter when some mechanical obstruction is present which prevents sodium iodide reaching the kidney pelvis.
3. Uroselectan usually gives a better outline in the presence of an obstruction, though not always.
4. Cystoscopy may not be necessary to localize a calculus in the urinary tract.
5. Uroselectan is very useful when one is unable to catheterize the ureters to get a pyelogram and ureterogram.
6. One may be deceived as to the pathological condition of the kidney when no uroselectan is excreted, and must be very careful about the conclusions drawn.
7. Uroselectan may be of use as a urinary antiseptic.
8. Movements of the ureter are seen, that is, systole and diastole.
9. Uroselectan is of great assistance to the urologist in diagnosis of difficult cases.
10. There was no reaction in this series of cases, following the intravenous injection.

* This series is from the Department of Urology in the Toronto General Hospital and the skiagrams were taken by the kind cooperation of the department of Radiology.

IMPLANTATION OF CARCINOMA BY AN OPERATION.—The following notes of a case of an unusual form of recurrence of growth, following an excision of part of the colon for carcinoma, are, I think, of sufficient interest to merit publication.

A man, aged 36, had had, eighteen months previously, two operations for abdominal trouble. In the first one, the bowel was drained through an incision in the right iliac region, and on the second occasion a growth was excised from the descending colon. Since then he had been quite well until a few weeks before seeing me, when he had vague abdominal pains, occasionally feelings of abdominal distension, and once, during an attack he vomited. On examination I found two scars: a left paramedian incision, and a smaller one on the outer side of the right rectus, which had obviously had drainage through it. Beneath the latter scar I detected a tumour, firm to the touch, dull on percussion, and slightly tender. A right paramedian incision was made, and the cæcum was found adherent to the abdominal wall by several fairly dense bands. These were divided, and the cæcum was completely freed, except for the appendix, which was anchored on to a dense hard mass adherent to the under surface of the old scar. I divided the appendix at the base and invaginated it in the orthodox manner. I then excised the appendix and tumour in one piece, together with the skin incision to which it was adherent. There appeared to be no evidence of infiltration of the tumour through the parietal peritoneum. I then examined the anastomosis in the descending colon. This was patent and free from adhesions, and there were no adhesions to any other part of the abdominal cavity, or evidences of metastases in the liver, spleen, glands, mesentery, omentum, or pelvis. The incision was then closed; the patient made an uninterrupted recovery. Examination of the tumour showed a mass of what appeared at first sight to be chronic inflammatory tissue and adhesions, with the appendix running right through the centre of it. A stained section under the microscope showed definite adenocarcinoma. Some months later he returned with evidence of recurrence in the pelvic peritoneum and glands.

In view of the fact that at the time of operation I could find no other evidence of growth in the abdomen, I can only conclude that at the previous operation an appendicostomy had been performed after the original growth had been handled by the operators, and that carcinoma had been implanted round the appendix at the same time. If this is so, it is a reiteration of the fact that one cannot be too careful in the precautions taken when operating upon cancer or other allied new growths. —J. R. Nicholson-Lailey, in *Brit. M. J.*, 1930, **2**: 864.

SOME IMMUNOLOGICAL PROBLEMS IN SEPTICÆMIA*

BY FRED T. CADHAM, M.D.,

Professor of Bacteriology, University of Manitoba,

Winnipeg

WHEN pyogenic microörganisms overcome all defences of the body, travel freely through, and even on occasion multiply in, the blood stream, giving rise to symptoms of a general invasion, the condition is recognized as septicæmia. Any definition of the term, however, is apparently subject to modification; for instance, with the extension and perfection of blood culture methods, microörganisms may be recovered from the blood in many states, such as typhoid and pneumonia, which are not classed as septicæmia. Then, too, disease entities exist in which the evidence suggests that there is a general invasion of an ultramicroscopic organism or virus. The diagnosis of septicæmia, then, rests not alone on laboratory procedures, but depends also on the clinical evidence. For this discussion I will consider the type of case in which the symptoms of a general bacterial invasion overshadow those of local origin, characterized, clinically, by chills, sweats, irregular temperature, and associated with the finding in the blood stream of the causative microörganism, generally a pyogenic coccus, most frequently a streptococcus. In the treatment of such cases the physician turns for help to the immunologist.

The origin and outcome of such a condition depend, naturally, on the two interdependent variables—the infective agent and the patient's resistance.

THE INFECTIVE AGENT

Briefly, let us consider the invasive power inherent to the microörganism. What is the influence of numbers? We know that a measured quantity of a certain microbe may at times be required to induce a septicæmia, yet, clearly, it is not the determining factor, for the few streptococci driven into the tissues and the lymph channels by the prick of a needle may initiate a rapid and fatal type of the disease, while on the other hand a massive infection frequently remains localized. That the power of elective localization of bacteria has an essential bearing on the question has been clearly demonstrated by Rosenow.[23] Even so, in elective localization the variable factor is in evidence, for a meningococcic infection occasionally exists only as a septicæmia, with no clinical or pathological evidence of any particular involvement of the meninges. Again, the *S. viridans* may invade the heart valves, which indicates that the microbe passed through the blood stream unaffected by the defences of the body, and possibly without giving rise at the time to clinical manifestations of its presence in the blood; subsequently a septicæmia arises from the endocardial focus.

An overwhelming invasion following the inoculation of a few organisms suggests that the circulatory system may be the elective site, for it is not unusual in some cases to find scant evidence that any particular tissue is involved, even though the microörganisms may be noted in direct blood smears. Besredka,[1] however emphasizes the importance of tissue immunity at the primary site of elective localization; according to his theory, a general invasion by the staphylococcus or streptococcus indicates a previous cutaneous or mucous area of infection.

The capacity to produce powerful toxins, to multiply rapidly, or to resist destruction is peculiar to certain bacteria. Such factors determine aggressiveness; while just as important, evidently, in favouring a continued bacteriæmia, is the inability of the causative organism to incite antibody production.

As a rule bacterial association favours a local infection, but that it is, in septicæmia, an im-

* Read to open a discussion in the Section of Bacteriology, Pathology, Physiology and Biochemistry at the combined meeting of the British and Canadian Medical Associations, Winnipeg, August 28, 1930.

portant factor receives slight support; however, a simultaneous general invasion of more than one microörganism may occur. Further, while one grants that septicæmias may be induced experimentally by the inoculation of a single selected strain of an organism, such as a streptococcus, yet the evidence shows that no single strain is responsible for all streptococcic septicæmias. Here, in carrying out agglutination tests with forty-five strains of streptococci recovered from as many cases of septicæmia, we failed to obtain any common agglutinative type.

Virulence as associated directly with the microbe lacks definition. More recent work, such as that of Falk,[10] stresses the theory that the dynamics of the electro-potential differences of the cells underlie some of these problems. For the further elucidation of the term virulence as related to the microörganism, Holman[16] suggests more intensive physiological studies of the metabolism of bacteria. These factors are bound up with the structure of the microbe; how infinitely complicated this may be one can judge from the fact, as Cameron[5] illustrates, that a comparable unit, such as a red blood cell, contains approximately a million million molecules and ions.

I have touched only on some of the principal characteristics of the microorganism which are believed to determine its invasive powers, for, aside from preventive measures, the nature of the microbe which infects the patient and produces a septicæmia is the accidental factor over which the physician has no control. The attenuation of the virulence of an infective agent by world-wide measures such as universal vaccine therapy is a problem not yet solved. In Winnipeg the incidence of septicæmia caused by the hæmolytic streptococcus shows periodic waves, suggesting the prevalence at intervals of a type or types of this streptococcus favouring such an infection.

THE PATIENT'S RESISTANCE

The rapid spread of an infection from a small focus indicates primarily an inability of the phagocytes, either leucocytes or clasmatocytes, to cope with the infective agent. A determination of the opsonic index in such cases frequently shows that the blood is deficient in natural opsonins. These opsonins when present facilitate phagocytosis until such time as the body responds with the production of specific antibodies, including the thermostable opsonins, for the bacteria and their products responsible for the infection.

This weakness in the defence, which allows the extended invasion of some bacteria, particularly the pyogenic cocci, the hæmatopoietic tissues may attempt to offset by an overproduction of leucocytes. It was characteristic of the cases of septicæmia in the series we investigated that an increasing leucocytosis paralleled a low opsonic index and a fall in complement. The frequent failure, however, of such a leucocytosis to overcome the infection suggests a more intensive effort on that ever-recurring problem—the early transference of specific immune bodies to such patients.

The production in the individual of specific antibodies to the infective organism requires time; the formation of such antibodies for the endotoxins and the bacterial substance postulates a previous dissolution of the bacterial cell. A hæmolytic streptococcus or a staphylococcus invasion may progress with such rapidity that death occurs before the lysis of a sufficient number of bacteria takes place that would stimulate the production of the necessary antibodies. Such an argument, of course, does not take into account the elaboration of antitoxins for those exotoxins that the microbe may produce. Even so, the development of such antitoxins frequently requires more time than the urgency of the patient's condition allows. A *S. viridans* infection, on the other hand, will persist in the heart valves for months, with just enough production of antibacterial substances to limit the subsequent general invasion to an intermittent bacteriæmia.

Should a sufficient interval of time elapse for the development of a leucocytosis and the elaboration of antitoxins, and of agglutinins, precipitins, opsonins, and lysins, without evidence that the patient is overcoming the infection, then, two factors in resistance, based on current concepts of immunity, may be specially considered. First, there may be a possible failure in antibody production, and secondly, even if such are elaborated, the body cells and fluids may fail to utilize them for the destruction of the microörganism or the neutralization of the toxins. The failure in bacteriolytic action may result, in part, from a deficiency in complement, that

property of the blood serum which the fundamental researches of Ehrlich[9] and Bordet[2] showed was essential to complete the lysis or death of bacteria in the presence of the immune body.

In this discussion I wish to dwell particularly on the influence of complement in septicæmia, a discussion which at once involves us in a consideration of the relation of complement to health and disease.

COMPLEMENT IN HEALTH

Complement, as a substance or state of the blood serum, exists, so far as we know, in all normal individuals. I have found but slight variation in the titre of complement in the serum of the blood taken from 500 persons in normal health, and under normal conditions. This power of complement was determined by its action against sensitized sheep cells. However, a slight diurnal variation was noted; approximately a 10 per cent increase occurred in the titre of the specimens of blood taken in the evening compared with those taken in the morning. The finding of a low complement power in a supposedly healthy person suggested disease or the results of disease; subsequent careful clinical examination of these persons proved this assumption to be correct. The results obtained indicate that complement is an attribute of health; further support of this statement is supplied by Huntemueller,[17] who, following investigations on Olympic athletes, states that a fall in complement titre of the blood serum occurred in overtrained competitors, but such did not occur in those who were in perfect condition, even after sustained exertion.

While it was thought that the blood of all normal animals contained the usual amount of complement characteristic of the individual species, yet there has been reported the existence of a race of guinea-pigs which showed a deficiency of this quality in the blood serum. Moore pointed out that these guinea-pigs were less hardy than the normal animal, and that their opsonic index was about one-half normal. Coca[7] determined that it was the third complement component, the heat-resistant or yeast-absorbed component, which was missing, and Hyde[18] reported the arresting fact that this characteristic of the serums of these guinea-pigs was inherited as a simple recessive Mendelian unit. Pertinent to the discussion is the fact that the deficient serum or plasma could be activated by very small amounts of serum from man or normal guinea-pig, *in vitro* or *in vivo*.

COMPLEMENT IN DISEASE

Is it not important to recognize that the complement property of the blood varies widely during disease? In 1914 Gunn[13] noted these changes in cases of typhoid, diphtheria, and scarlet fever. Our investigations, in part previously reported, of over one thousand patients, also showed that this property, as tested by the hæmolytic system with sensitized sheep cells, varied from an increase of 20 per cent over normal to a complete absence, depending upon the nature, location, and stage of the disease. As a rule these fluctuations follow a uniform course; commonly there is a slight increase in complement coincident with the onset of the symptoms of the disease; this is followed by a steady decrease until the infection reaches its maximum; during convalescence complement gradually returns to normal. However, in some cases, the complement property of the serum gradually decreases until no evidence of its presence, unless reactivated, can be observed by the use of the hæmolytic system. These latter cases as a rule terminated fatally, but exceptions were noted. More recently Hadjopoulos and Burbank,[14] in an extensive series of investigations on the blood of persons in health and disease, arrived at similar conclusions, while Goldner[12] stresses the association of a decrease in complement with those infections which interfere with liver function.

We observed that, as a rule, patients with chronic diseases such as tuberculosis, syphilis, chronic arthritis, uncomplicated malignant disease, goitre and diabetes, showed but slight oscillation in the complement titre of the blood serum. However, in a patient with an acute infectious disease, and particularly septicæmia, the fall in complement titre following the initial rise was rapid, as determined by the method of investigation described.

What component of complement is missing in the serum obtained from the patients with these diseases I have not yet been able fully to determine; but a slight reactivation, 10 per cent, occasionally occurs on the addition of heated normal serum, while an average of 20 per cent re-

activation was obtained by the addition of that inactivated by ammonia. In some instances a slight reactivation was noted following the addition of serum which had been inactivated with a bacterial culture, yet if the blood of a patient with streptococcic septicæmia showed a deficient complement, practically no reactivation could be obtained by the addition of normal serum which had been inactivated by previously mixing such serum with the specific streptococcus. Muir[22] and Browning,[3] however, have shown that the removal of the natural bactericidal power of normal serum by treatment with dead bacteria may leave the hæmolytic power of complement unaltered.

The recognized necessary part played by complement in the antibacterial action of blood *in vitro* raises the question of the influence of this property in the circulating blood. Long ago Muir[22] emphasized the importance of this factor in immunity, and the dependence on complement of the opsonic action of normal serum. Then, too, that complement exists in the blood plasma in amounts proportional to that noted in the blood serum has been shown by several investigators (Kolmer[19]), and Hyde[18] has demonstrated the action of hæmolytic complement for foreign erythrocytes in the circulatory system of the frog.

The dependence on complement of the opsonic action of normal serum suggests that this property exerts some influence on the susceptibility to infection, but to what extent has not been established. However, the necessary part played by complement in bactericidal action in conjunction with antibodies indicates that it is an important factor in determining the limits of an infection. It is logical to infer, if not to state, from the available evidence, that a high complement titre in the blood of a patient with septicæmia aids materially in overcoming the infection.

COMPLEMENT IN TREATMENT

How may the treatment of septicæmia be influenced by deductions drawn from these observations? Small amounts of normal serum, even at times one-quarter of 1 per cent, will activate blood deficient in complement, both *in vitro* and *in vivo*. I have determined that the addition of small amounts of normal serum would reactivate serum obtained from a patient's blood which was deficient in cytolytic activity; in patients showing a deficiency of complement resulting from infection reactivation occurred following transfusions of small amounts of serum derived from the blood of normal persons or animals. This reactivation is immediate, and lasts, as a rule, two to three days, when the serum tends again to show a deficient complement titre, provided the infection which caused the original loss in complement has not abated.

In view of these findings it appeared logical to give repeated transfusions of small amounts of serum from the blood of a normal compatible donor to patients with septicæmia. It may be suggested that transfusions of whole blood would have accomplished the same purpose. Small whole blood transfusions do activate complement *in vivo*, but with this difference—that the decrease in complement titre which frequently again occurs about the third day is considerably more marked than that which follows transfusions of serum.

As regards massive normal blood transfusions for sepsis, I have observed in three patients who received such treatment that subsequently a severe loss of complement occurred by the third day, a greater loss than would be expected as the result of the infection, and within a week the complement titre of their blood serum had dropped 20, 40, and 50 per cent lower respectively than before such transfusions were made. Consideration must also be given to the problem, as suggested by Wright,[24] that such whole blood transfusions may furnish a pabulum which aids the further multiplication of the infective bacteria.

ANTIBODY AND COMPLEMENT

We found in patients with sepsis that the relation between antibody and complement followed a general rule—namely, if the patient failed to improve, and the blood showed a high complement titre, then the antibacterial content of the blood for the causative microörganism was low, and, conversely, in such patients, if the antibody content of the blood was high then the complement titre held to low values. The immune content of the blood for the specific infection was determined by the agglutination reaction and by complement fixation.

Provided the complement is normal or is raised to a normal power, then to complete the

destruction of the infective microörganism by bacteriolytic action, and to facilitate phagocytosis, specific antibodies are deemed essential. Yet the preparation of a specific immune serum for those organisms most frequently connected with septicæmia has always offered a problem of the greatest difficulty.

The frequent failure of the administration of an anti-streptococcic serum to benefit the patient in a case of streptococcic septicæmia is generally held to be the result of an absence in the serum of essential antibodies. The animal from which the serum was derived may have been immunized by a different strain of the microorganism from the one responsible for the infection in the patient. In an attempt to overcome the latter difficulty we inoculated rabbits with separate vaccines and toxins prepared from over fifty strains of streptococci and staphylococci recovered from as many different patients with septicæmia. On experiment these animals became highly resistant to induced infection.

Further, Gay[11] points out that the evidence indicates that the reservoir for antibody is in the cells. Again, experiment shows that a specific stimulus, such as the inoculation of a vaccine, causes the appearance in the blood of homologous antibodies, if such are present in the tissues. Then, too, success in the treatment of septicæmia has been reported following transfusions of blood from a donor who had been previously inoculated with the specific organism. Sir Almroth Wright[24] outlined the immunological factors involved in such a procedure, and the method has been further developed by Colebrook and Storer.[8] I have applied these principles in an endeavour to increase the antibody content of an immune animal serum, which was to be used in the treatment of septicæmia. One of the rabbits which had been previously inoculated, as before described, with some fifty strains of streptococci and staphylococci was re-inoculated with a broth culture containing the specific strain of the organism obtained from a positive blood culture, and several hours subsequently 8 to 10 c.cm. of blood were withdrawn from the rabbit's heart under aseptic precautions. The serum of such blood frequently gave a high agglutinative titre for the specific microörganism with which the animal had been inoculated several hours previously. A further procedure was to inoculate rabbits on alternate days with a vaccine and toxin prepared from the microbe isolated from the blood of the patient. If the course of the disease allowed for a sufficient interval of time to elapse for these rabbits to have developed specific antibodies, the serum from the blood of such animals was also used.

TREATMENT WITH NORMAL AND IMMUNE SERUM

We have treated with serum 56 patients who were suffering from septicæmia; the majority were in an advanced stage of the infection, and with these this method of treatment was adopted as a last resort; forty-five recovered. Blood cultures showed: in 38 cases a hæmolytic streptococcus, in 6 a *S. viridans,* in 5 a staphylococcus, in 1 an unidentified diplococcus, in 1 a colon bacillus, in 3 both a streptococcus and a staphylococcus, and in 1 a staphylococcus together with the *B. pyocyaneus.* Each case in which blood cultures indicated a double infection proved fatal.

The following method of treatment was adopted. A compatible donor reported at the laboratory. From 60 to 70 c.cm. of blood were withdrawn from a vein in the arm into a large sterile vacuum tube. The blood was allowed to clot at room temperature, then placed in the ice chest. Five to eighteen hours subsequently the serum was drawn into a sterile glass syringe, and then the patient was transfused with this serum. These transfusions were given every second day; four of such treatments constituted the average number given to a patient. On alternate days 2 to 5 c.cm. of immune serum from a rabbit, prepared as previously described, were inoculated subcutaneously. It needs to be pointed out here, however, that the extended therapeutic use of rabbit serum has obvious limitations; the animals are small, comparatively short-lived, and susceptible to certain infections.

This method of treatment does not contraindicate the search for foci and surgical intervention for the elimination of the same when such a procedure is feasible. Moreover, it is recognized that the nature of septicæmia varies widely, and a patient with apparently an overwhelming bacterial invasion may recover without special therapeutic aid; hence the value of any particular method of treatment, judged by clinical results, is open to discussion. Besides, as suggested by Churchman[6] in a masterful review on the intravenous use of dyes, thought needs to be given to the possibility that attempts

at rapid sterilization *in vivo* may defeat their own purpose; serious results do follow the too rapid absorption of freed endotoxins.

OTHER FACTORS

While one may stress the value of complement and antibacterial substances generally as a part of the defensive mechanism against an extended bacterial invasion, yet the importance of any single factor naturally varies with the individual case, also with the numerous associated processes. So interrelated are these that obvious difficulty arises in confining the scope of this discussion. One would like to consider the absorbing questions of the origin and nature of complement and of the influence of diet and drugs on this property, and of the chemical nature of antibodies and their possible synthetic production. Mention may be made, however, of the work of Mellanby and Green[20] in the treatment of puerperal septicæmia with vitamin A. An evaluation of this work involves consideration of both the physiological and the biochemical relation of vitamins to immune processes. Then, too, the beneficial results occasionally obtained in sepsis, following the use of scarlet fever antistreptococcic serum, touches the live question of the relation of the toxins from the various strains of streptococci to one another. Also of arresting interest are the observations of Gay, suggesting either the possible mobilization or passive transfer of the tissue macrocytes. In addition, the influence, however uncertain, of the bacteriophage demands attention; in five of our series of cases it was noted that following treatment the specific organisms were undergoing bacteriophagy; recovery occurred in these cases. In four cases with a fatal termination, when it was possible to obtain the organism from a focus, there was no evidence that a bacteriophage for the causative bacteria was present. According to d'Herelle,[15] if a bacteriophage for a microörganism causing infection is active *in vivo*, then the prognosis becomes more favourable.

It must not be overlooked that some cases of septicæmia offer little hope from the therapeutic standpoint. The destruction of tissue in scattered lesions caused by direct bacterial action is frequently beyond functional repair; especially does this apply to lesions in the brain or heart. Particularly, an infection engrafted on a previously injured heart and giving rise to a septicæmia generally signifies a permanently damaged endocardium, resulting in cardiac incompetence that no method of therapy based on immunological studies will rectify. This latter problem suggests some other method of approach, and since a subacute bacterial endocarditis with an associated bacteriæmia is prone to develop in an individual with valvular lesions, then the possible prophylactic immunization of a person with a damaged endocardium by means of a polyvalent streptococcus vaccine deserves consideration.

Immunity problems of septicæmia naturally concern all the sciences represented in this section of the annual meeting; possibly correlation of the results obtained through the various lines of approach, either clinical or experimental, may furnish some solution. Admittedly, up to the present, the clearing hewed out of the gloom of immunology by Pasteur, Ehrlich, and their disciples has been well and hopefully tilled, only to produce, in septicæmia, limited therapeutic results. The quickening light afforded by the efforts of those early workers now becomes shaded with the growing clouds of doubt, and some predict barren returns from further efforts in that field. They say we must seek or make new clearings. In advancing some of these problems for discussion to-day it is with the hope that the old furrows retilled, or possibly the turning of a new furrow, may prove the field still fruitful.

DISCUSSION

PROF. WILSON (London) wished to know whether, in the titration of complement, allowance had been made for the natural anti-sheep hæmolysin present in human serum. In view of the fairly marked variations found by other workers in the normal complementary titre, he would like to see Prof. Cadham's actual figures, so that it might be possible to work out the standard deviation of the mean of each group, and the standard deviation of the difference between the means of the two groups of normal and diseased persons. Gunn's work did not altogether support Prof. Cadham's thesis, since he had found that complement in enteric fever and certain other diseases was generally raised during the pyrexial period, and might be present in large amount even just before death. It was very difficult to interpret the meaning of fluctuations in the complementary titre; a fall in titre might be ascribed to diminished production of complement, or to a combination of the existing complement with antibodies; unless the antibody titre was determined simultaneously, it was impossible to know which interpretation was correct. Our best results in passive immunization had been obtained with antitoxic sera; there was less evidence that antibacterial sera were of any great value. Possibly the toxic bodies liberated by certain bacteria were non-antigenic; this might account for our failure to produce efficient anti-endotoxic sera. In conclusion, Prof. Wilson pointed out that the

results of any form of treatment must ultimately be judged by statistical analysis.

PROF. OLIVER S. WAUGH (Winnipeg) dealt with the subject from the clinical point of view. While only one case of Cadham's series was his own patient, he had seen a large number of the series. To the surgeon an acute pyogenic infection is of grave importance, leading to apprehension, for the methods previously available for combating such an infection have been largely empirical. Vaccines have not been beneficial in acute conditions, and chemotherapy and other treatments are disappointing or useless. Eighty to 90 per cent of such cases prove fatal. Professor Cadham would appear to have used the body as a human test tube to build up a lytic reaction against the invader. Some of the recoveries obtained in Winnipeg by his treatment had been astonishing, especially since the method has for the most part been used as a last resort, and some of the patients have been unconscious and in an extremely alarming condition. Dr. Waugh stressed the importance of early diagnosis and treatment of various foci as potential sources of septicæmia.

PROF. ROBERT MUIR (Glasgow) expressed high appreciation of the painstaking work that Prof. Cadham had reported. He considered it important to try to understand exactly what we meant by septicæmia. There were two extreme types of bacterial invasion of blood: one, exemplified by typhoid fever, in which the bacterial invasion was reduced as rapidly as it occurred; the other, a more rapid invasion leading frequently to a rapid fatal termination. Clinical cases presented all intermediate stages, and septicæmia remained a very hazy term. It was essential to recognize that phagocytosis was all-important for destruction of organisms, and he considered that complement was not so important as antibodies for recovery. The raising of the complement titre observed by Prof. Cadham he regarded as an important biological observation. In septic infections there were many borderline cases and a little something to help might make all the difference.

PROF. WILLIAM BOYD (Winnipeg) thought that immunologists should not overlook entirely the findings of morbid anatomy in connection with their work.

PROF. CADHAM, in the course of his reply, stated that he could not entirely agree with the view that complement was not involved in the toxin-antitoxin reaction. He would not wish to advocate his type of treatment as the most desirable, but hoped that the discussion would prove to have been useful.

REFERENCES

1. BESREDKA, Local Immunization, Williams and Wilkins, Baltimore, 1927.
2. BORDET, *Ann. de l'Inst. Pasteur* **12:** 688, 1898.
3. BROWNING, Immuno-Chemical Studies, Constable, London, p. 180, 1925.
4. CADHAM, *Canad. M. Ass. J.* **16:** 352, 1926; *Ibid.*, **19:** 54, 1928.
5. CAMERON, *Trans. Roy Soc. Canada* **23:** (Sect. v) p. 151, 1929.
6. CHURCHMAN, *J. Am. M. Ass.* **85:** 1849, 1925.
7. COCA, *Proc. Soc. Exper. Biol. & Med.* **18:** 71, 1920.
8. COLEBROOK AND STORER, *Lancet*, **2:** 1341, 1923.
9. EHRLICH, Studies on Immunity, first edition, p. 181.
10. FALK, The Newer Knowledge of Bacteriology and Immunology, Jordan and Falk, University of Chicago Press, p. 565, 1928.
11. GAY, *Ibid.*, p. 881.
12. GOLDNER, *Deut. med. Woch.* **55:** 390, March 8, 1929.
13. GUNN, *J. Path. & Bact.* **19:** 155, 1914-15.
14. HADJOPOULOS AND BURBANK, *J. Lab. & Clin. Med.* **14:** 131, 1928.
15. D'HERELLE, Immunity in Natural Infectious Disease, Williams and Wilkins, 1924.
16. HOLMAN, The Newer Knowledge p. 102, 1928.
17. HUNTEMUELLER, *Münch. med. Woch.* **76:** 490, 1929.
18. HYDE, *Am. J. Hygiene* **7:** 619, 1927; *Ibid.* **8:** 859, 1928.
19. KOLMER, Infection Immunity and Biologic Therapy, third edition, W. B. Saunders Co., p. 345, 1925.
20. MELLANBY AND GREEN, *Brit. M. J.* **1:** 984, 1929.
21. MOORE, *J. Immunology* **4:** 425, Nov. 1919.
22. MUIR, Studies on Immunity, London, 1909.
23. ROSENOW, The Newer Knowledge, p. 576, 1928.
24. WRIGHT, *The Lancet* **1:** 489, 1919.

BOVINE TUBERCLE BACILLI IN PULMONARY TUBERCULOSIS.—A. S. Griffith calls attention to the number of cases of pulmonary tuberculosis examined recently which have been found to be due to tubercle bacilli of the bovine type. Before 1924 only four cases of bovine infection had been reported in Great Britain; since that date, however, seventeen patients have been discovered who were expectorating bovine tubercle bacilli. With one exception these recent cases have all occurred in Scotland, and have been studied by Munro. Taking all the figures together, 3 out of 327 patients in England, or 1 per cent, have been found to be infected with bovine bacilli, while in Scotland 18 out of 468 have been found, or approximately 4.5 per cent. Clinical and post-mortem investigations indicated that the majority of these patients had been infected by the alimentary tract; the portal of entry in the remainder was doubtful. The author discusses the comparative rarity of ulcerative pulmonary tuberculosis as a sequel to alimentary tuberculosis of bovine origin. He suggests that a dissemination of bovine bacilli in amounts sufficient to give rise to miliary tuberculosis of the lungs may invariably prove fatal; and secondly, that bovine pulmonary tuberculosis may be more frequent than it appears to be. Owing to the fact, however, that the lesions in the lungs are of vascular origin, they are less liable to break down than those of respiratory origin, and consequently bovine bacilli rarely appear in the sputum.—*J. Path. & Bact.*, 1930, **53:** 1145.

NERVOUS SEQUELS OF VARICELLA.—Laignel-Lavastine, Miget, and Constantinescu record the case of a lad, aged 18, who while convalescing from an apparently mild attack of varicella developed symptoms of meningitis with convulsions and died in five days. Post-mortem examination of the brain and meninges confirmed the diagnosis of purulent meningitis with a cortical reaction. Tuberculous meningitis could be excluded by the negative results of bacteriological examination and the inoculation of guinea-pigs. Meningeal reactions are frequent in varicella, but this is believed to be the first case recorded in which meningitis occurring in convalescence from varicella has ended fatally.—*Bull. et Mem. Soc. Med. des Hôp. de Paris*, October 20, 1930, p. 1448.

OBSERVATIONS ON THE SYMPATHETIC NERVOUS SYSTEM*

BY W. J. MAYO, M.D., LL.D., F.R.C.S. (HON.),

Rochester, Minn., U.S.A.

"HE that does not go beyond the facts will seldom get as far as the facts" (Huxley). In research this axiom tells the story. Starting by deductions from facts, scientific imagination develops hypotheses which are proved or disproved through that form of inductive philosophy which we call research. Although we desire positive results, negative results have value, and often negativity itself starts a new deduction which leads to the truth. The history of our understanding of the sympathetic nervous system well illustrates the value of both positive and negative scientific contributions.

ANATOMICAL LANDMARKS

Petit (1724) pointed out that stimulation of cervical sympathetic nerves caused dilatation of the pupil, and Winslow (1732) deduced from measurements that the sympathetic nerves did not arise from the cranial nerves. Haller (1757-1766) first discovered the rami communicantes, which marked a great step forward in our knowledge of the sympathetic nervous system. Remak (1838) discovered that there were two types of fibres in the system, the medullated or pre-ganglionic, and the non-medullated or post-ganglionic, and Müller (1840) contributed a theory as to their respective functions. The splendid research of Gaskell, published in 1885, put our anatomical knowledge of the sympathetic nervous system on a sound basis, and Langley and Dickinson (1895) followed with new knowledge of the pelvic part of the parasympathetic system.

PHYSIOLOGICAL LANDMARKS

For a long time Bichat's theory (1830) held the field—that is, that the cerebro-spinal system brought us into contact with the outside world, but that the sympathetic system regulated the nutrition of the body. This was finally disproved by Gaskell's demonstration of the interrelation between the two systems, aided by the method, published by Langley and Dickinson (1889), of distinguishing between pre-ganglionic and post-ganglionic fibres by the use of nicotine. Experimental work on the physiology of the sympathetic nervous system dates from 1851, when Claude Bernard discovered that when the sympathetic nerve is cut in the neck of a rabbit the blood vessels in the ear of the same side become much dilated. Since then the fundamental work of the Cambridge school of physiologists has been followed in Europe by that of Jaboulay, Leriche, Jonnesco, Daniélopolu, Förster, and Bruning, in Australia by that of Hunter, Royle, and Wade, and in America by that of Kunz and Cannon. The contributions of Hunter and Royle led to the remarkable recent advance in our working knowledge of the sympathetic nervous system, the practical application of which had most encouraging results.

AUTONOMIC NERVOUS SYSTEM AND ENDOCRINE GLANDS

While we are thrilled with these researches, and by the surgical adventures which they have stimulated in the practical application of their results to disease, let us not lose sight of the autonomic nervous system as a whole, of which the sympathetic system is only a part. Moreover, the endocrine glands, chiefly the thyroid gland, the suprarenal glands, and the hypophysis, are in close functional association with the sympathetic nervous system, and the suprarenal glands and hypophysis contain cells derived from the Anlage of the nervous system. Studies of the interrelation between the central nervous system, the sympathetic nervous system, and the internal secretions, hormones, vitamins, light rays, and other biochemical phenomena which have to do with foods, are contributing new knowledge of the human economy for application in medicine and surgery. In the short time at my disposal I shall touch lightly on a

* Made in opening a discussion in the Section of Surgery of the combined meeting of the British and Canadian Medical Associations, Winnipeg, August 29, 1930.

few problems, the solution of which depends on a better understanding of the physiology of the autonomic system.

Thyroid gland.—In the elucidation of the relation of iodine to disturbances of the thyroid gland we owe much to Marine and to Plummer. Plummer showed that, contrary to generally entertained views, the prescription of iodine would remove the immediate effects of the deleterious secretions of the excited thyroid gland, and would restore patients to a condition in which thyroidectomy, formerly a hazardous operation, became one of safety. Plummer also demonstrated that although iodine had this remarkable effect, the improvement was to a large extent temporary, and that this drug was in no sense curative. The surgeon no longer depends on his own clinical knowledge in the diagnosis of thyroid disease, and decides on operation only when aided by the clinician and the metabolic laboratory.

Suprarenal glands.—Of great importance are the suprarenal glands and their different secretions from the cortex and from the medulla. The small medullated nerves which arise from the lateral horns of the spinal cord pass to sympathetic ganglions, with the single exception that certain of these nerves pass to the suprarenal glands, where they are distributed to the cells of both cortex and medulla. In the last fifteen years the growth of knowledge of the function of the suprarenal glands has come through the work of clinicians and their co-workers in laboratories. With regard to bilateral organs, if one organ is intact it is sufficient for bodily purposes, and this is true of the suprarenal glands. In a number of cases I have removed a suprarenal gland because it was involved with a diseased kidney, and in subsequent clinical observation of the case I was not able to find that this procedure had any demonstrable effect on the patient.

Vascular type of sympathetic dysfunction.—These important glands, the thyroid and the suprarenal, are closely associated with the vascular phenomena of certain diseases which recently have been attacked through the sympathetic system. Thus Raynaud's disease has been definitely ameliorated by operations on the sympathetic ganglions and trunks; by the same procedure it is possible to check the progress of certain types of arthritis which lead to permanent crippling and to deformity, and of angioneurosis, which gives rise to certain forms of scleroderma of the face, neck, and extremities. Patients suffering from thrombo-angiitis of the extremities have been benefited by removal of the appropriate sympathetic ganglions and trunks. Is it not possible that chronic interstitial nephritis (Bright's granular nephritis) is the end-result of the same vascular type of sympathetic dysfunction? It has been shown that excision of its sympathetic nerves appears to have a marked influence on the congenital types of dilatation of the colon which are grouped under the general heading of Hirschsprung's disease.

CONTROL OF VISCERAL FUNCTIONS

In considering the parasympathetic system, one wonders whether the vagus nerves may sustain an unsuspected relationship between the emotions and the heart, just as one wonders about the exact relationship of Langley's pelvic nerves to certain obscure happenings in and around the bladder, the pelvic portion of the colon, and the rectum.

When one tries to visualize the various forms of local control one may postulate that smooth muscle fibre was among the very earliest of the self-controlled tissues. Unstriated muscle may originate its own action, and within the limits of the influences which necessitate this action it is self-sufficient. The ultimate source of this power, which carries on the vegetative functions, is molecular and colloidal energy released through enzyme action, as marvellous as the energy stored in radium. Cathcart and Benedict estimate that only 25 per cent. of the energy produced in the body can be expended by tissues under the control of the will, 75 per cent being used by the so-called vegetative functions of the body, of which we are unconscious.

In the intramural plexuses, which to a large extent control motion in the gastro-intestinal tract, we see what might be described picturesquely as pre-sympathetic ganglions, and one might even suggest that this may be true of the sino-auricular node and the bundle of His in the heart. In the unconscious control of visceral functions through the sympathetic and parasympathetic systems, and the related glands of interaction, one might imagine that the heart is still showing the effect of an early form of

control by primitive emotional centres which existed long before the intellectual organs developed.

PSYCHIC INFLUENCES

A supreme relationship originated in that shadowy day when hunger and fear, and love and hate, ruled the early ancestral state. Perhaps the psychic influences of this relationship have lost none of their magic. Our emotions and our capacity for acquiring knowledge are hereditary. Emotions may be said to be the outgrowth of those experiences which we call instincts in the lower animals, reactions which existed before the development of true intellectual centres. Unstriated muscle is unconsciously controlled; striated muscle is under conscious control. But the heart is composed of a primitive type of striated muscle. Does this indicate an ancient form of control by unidentified emotional centres? Does the anatomically low origin of the vagus nerve indicate such a primitive cardiac function? Note the direct connection of the suprarenal glands with sympathetic nerves. In other words, does stern control of the emotions throw stress on the heart, and lead to degeneration of its musculature and to coronary disease?

Do such speculations lead us to believe that by further refinements of diagnosis at the hands of physicians familiar with the electrocardiograph and with other methods of precision the surgeon will be enabled, in early cases of impending vascular disease of the heart, to relieve the strain on its muscle by division of nerve fibres or by extirpation of sympathetic ganglionic tracts, In susceptible persons, spasmodic constriction of the arteries in Raynaud's disease, scleroderma of vasospastic origin, and some types of arthritis, eventually leads to vascular obstruction. How about the heart? Is angina pectoris a similar vasospastic phenomenon, and coronary and myocardial disease its end-result? In the final analysis, heredity may be found to be a controlling factor.

From the Royal Victoria Hospital in Manchester attention has been called to the fact that a common cause of death among surgeons is disease of the heart, especially coronary stenosis, coming on in the latter part of the sixth and the early part of the seventh decade of life. In all other respects the surgeon maintains his general health equal to others, and often post-mortem examination does not show evidence of other serious disease. The tendency to death from heart disease is not confined to surgeons, but is common to all men who live lives of stress, in which stern control of the emotions is necessary. It is true that much of the disability among surgeons is due to the fact that surgery is to a certain extent a handicraft, and that age and anxiety produce reduction in skill; but, after all, that is not the most serious consideration. The keen clinician, as he grows in experience, becomes more and more valuable as age advances. He is not exposed to those malign influences of anxiety and responsibility to the same extent as is the surgeon. One might say that the clinician sees his patient drowning and throws him the best means of relief he has, but that the surgeon, in order to give relief, jeopardizes the patient anew.

OPIUM ADMINISTRATION IN DIABETES.—R. N. Chopra and J. P. Bose systematically examined a series of hospital patients suffering from diabetes in order to test the accuracy of a belief prevalent in India that small doses of opium are beneficial in this disease. The patients were kept strictly on the same diet for a few days before and after the period during which the drug was being tested. When the daily output of sugar in the urine ran at a constant level the drug was given in gradually increasing doses, the excretion of sugar being carefully measured every day, and the blood sugar examined at regular intervals. The psychological element was eliminated by masking the taste and smell of the opium with oil of citronella so that the patient had no idea of what drug was being employed. The initial dose was 1 to 2 grains a day, increasing by 1 grain every third or fourth day until from 6 to 8 grains were being taken daily, when the drug was stopped, either suddenly or gradually. Some patients received as much as 10 to 12 grains each day without experiencing the least discomfort, By these means it was found that the administration of small doses of opium (1 to 6 grains daily) slightly reduced the total urinary output in mild cases, but in serious cases there was no reduction in the polyuria, thirst, or frequency of micturition. In early and mild cases opium has a well-marked effect in reducing the total daily excretion of sugar in the urine, even causing complete disappearance in some instances, but in serious cases it had no effect on the sugar output. The drug has but little effect in reducing the blood sugar; in severe forms of the disease it actually increases it. The authors conclude that its use is inadvisable in diabetes, since in some patients the renal threshold for sugar excretion is raised thereby; while the sugar disappears from the urine the amount in the blood is increased.—*Indian J. Med. Res.*, July, 1930, p. 15.

THE CLINICAL RESULTS FOLLOWING THE OPERATION OF SYMPATHETIC RAMISECTION*

BY N. D. ROYLE, M.D., CH.M., F.C.S.A.,

Orthopædic Surgeon, Lewisham Hospital,

Sydney, Australia

SYMPATHETIC ramisection was introduced by me in October, 1923, for the treatment of spastic paralysis. It followed upon experiments carried out to investigate the apparent failure of reciprocal innervation in spastic conditions. The results of these experiments are recorded elsewhere.[1]

De Boer had previously found that the normal tonus of the hind limb of the frog and the cat disappeared when the rami communicantes of the sympathetic ganglion were cut. Other investigators obtained similar results, but I was unaware of these when I carried out my experiments.

TONE

When the limb was deprived of its sympathetic nerve supply it behaved differently from a normal limb in that it showed a loss of resistance to passive movements; in addition, it exhibited an inability to oppose gravity in the decerebrate, anæsthetized, and normal passive animal—that is, there was a loss of the posture-maintaining mechanism. The different behaviour of a limb deprived of its sympathetic nerve supply was attributed to a loss of tone.

There is considerable controversy about the exact nature of tone, and a definition is difficult to give, but the definition that I use is that tone is the expression of a proprioceptive mechanism subserving posture, and is present in muscles which have been stretched or are being stretched—that is to say, it is not exhibited to any extent by muscles at rest.

Over this mechanism of tone we have no conscious control except as a concomitant to active contraction. There is a small amount of tone in a normal muscle which is overcome by the contraction of the opposing group, but is not directly inhibited. Though I do not subscribe to the idea of co-contraction, tone is certainly induced by stretching the opposing group in any movement.

The upper eyelid maintains a definite posture in the waking stage in response to the stretching imposed by gravity. We cannot voluntarily make this posture any more fixed or any less fixed, but the tone is not sufficient to impede movement in changing the position of the lids. If through some pathological change tone becomes abnormally increased, as it does in spastic paralysis, it not only increases the tendency to maintain posture, as is shown by the persistent attitudes of spastic hemiplegia, or by the inability to balance in spastic paraplegia on account of rigid limbs, but it also forms an obstruction to movement. There is an apparent failure of reciprocal innervation due to an increase in tone in opposing groups of muscles. For example, the excessive tone of the flexors of the elbow or knee induced by stretching cannot be inhibited when the extensors are contracting. Although this may not appear in the laboratory animal it does in the intact human subject.

The chief indication for the operation of sympathetic ramisection is the failure of inhibition in voluntary muscles. This is expressed by delayed relaxation time in reflexes, as in the knee-jerk, and by the inability to relax the muscles quickly. There must also be present definite cortical control over the muscle group for the operation to be effective. The essential change following a ramisection is that the patient no longer has to inhibit the excessive tone of his formerly contracted hypertonic muscles if cortical control is present. Sympathetic ramisection does not remove contractures of fibrous tissue, nor does it restore cerebro-spinal pathways. It decreases tone, and thus enables pa-

* Read in opening a discussion in the Section of Surgery at the combined meeting of the British and Canadian Medical Associations, Winnipeg, August 29, 1930.

tients to move smoothly and more rapidly. Movements are gained or regained as a result of operative treatment, as in the intrinsic muscles of the hand or the common extensors of the fingers, because the patient is able to relax the opposing groups. The relaxation of flexion of the fingers, for example, allows extension to be performed. (This statement does not apply in athetosis).

RESULTS IN VARIOUS SPASTIC CONDITIONS

I have now performed the operation of sympathetic ramisection approximately six hundred times, with three deaths. Two of these deaths were from embolus shortly after the operation, and one was from pneumonia in the first week following operation. Thus the operative death rate is 0.5 per cent. Approximately three hundred patients underwent operation, and two operations were performed upon each patient. In some instances all four limbs were deprived of their sympathetic nerve supply. In the case of the upper limb, it is interesting to note, a sympathetic trunk section performed bilaterally in the upper thoracic region has not apparently a detrimental effect on the cardiac mechanism. Many patients were able to play vigorous games after operation without discomfort. Many of the operations I performed must be regarded as experimental.

To ascertain the effect of operative treatment in spastic paralysis and allied conditions, I sent a questionary to each of my patients and received one hundred and twenty-six replies, and in each case it is from the patient's or parent's own opinion of the improvement that the figures are compiled. My records show that the remainder of the patients who did not reply had similar if not better results. The patient or parent is, after all, the best judge of improvement, although he is not able to recognize the physiological changes following ramisection when complicated by some other condition. For example, one parent returned the answer, "No result at all," when to my knowledge and from cinematographic records the practical and physiological result was good, but was marred by the presence of bilateral talipes calcaneus, which did not allow the patient to walk properly. Another patient, 23 years of age, who walked for the first time in her life six weeks after operation, returned the result, "Good, with room for improvement." I think most surgeons who treat spastic paralysis would have classified the result as excellent.

The following are the patients' own opinions of their improvement in answer to the question if the results could be classified as: (1) excellent, (2) good, (3) poor, (4) no result at all.

Congenital spastic paraplegia.—Thirty-seven patients or parents replied as follows:

Excellent	8	(21.62 per cent)
Good	20	(54.05 per cent)
Poor	5	(13.51 per cent)
No result at all	4	(10.8 per cent)

Some result was obtained in at least 88 per cent of all patients and good or excellent results were obtained in 75.6 per cent.

Congenital spastic hemiplegia. — Thirty-five patients or parents replied as follows:

Excellent	11	(31.42 per cent)
Good	14	(40 per cent)
Poor	9	(25.71 per cent)
No result at all	1	(2.85 per cent)

Some result was obtained in 97 per cent and an excellent or good result was obtained in 71.4 per cent. Many of these results followed my old operation of cervical ramisection. On October 6, 1929, I introduced a more complete operation, and the recent results are better.

Congenital spastic chorea.—Ten patients or parents replied as follows:

Excellent	3	(30 per cent)
Good	4	(40 per cent)
Poor	3	(30 per cent)
No result at all	*nil*	

In patients suffering from this disease some result was obtained in 100 per cent and an excellent or good result was obtained in 70 per cent. Patients with all degrees of spastic chorea were treated, from those with spasm which resembled decerebrate rigidity to those with choreiform movements preventing the patient feeding himself or standing up properly. This so-called spastic chorea is not a true spastic condition, as the patient is really not spastic during his quiescent periods. That is to say, there is no opposition in passive movement but the patient is unable to inhibit the choreiform movements.

Acquired spastic hemiplegia.—This section includes cases arising from cerebral hæmorrhage, embolus, gunshot wounds, and trauma. In most patients my old operation of cervical ramisection was performed.

Excellent	4 (21.5 per cent)
Good	7 (36.8 per cent)
Poor	7 (36.8 per cent)
No result at all	1 (5.2 per cent)

Some result was obtained in 94 per cent and an excellent or good result in 58 per cent. The results are very much better with thoracic sympathetic trunk section, as shown by the result of a more complete operation in the following case report.

Thirty-eight years previously the patient had had what was described as a heat stroke, resulting in a fit. This was followed by loss of function in the right upper limb. She had had various forms of treatment, and when she presented herself she had regained the ability to move the hand, but the movements were slow and difficult. She could not extend her fingers with the wrist dorsiflexed, nor could she supinate the hand or extend her arm above her head. She had some control of the intrinsic muscles, but she could not place her thumb on the little finger. The reflexes were hyperexcitable and the relaxation time was prolonged. There was resistance to passive movements of the right upper limb in all directions.

Right sympathetic thoracic trunk section was performed on April 2, 1930. This was followed by an immediate loss of tone and relief of her spastic condition. She regained the movement of dorsiflexion of the wrist and supination of the forearm within a few days. The patient was able to shake hands; this was the first time she had used her hand in this way for thirty-eight years. She could put her thumb on her little finger with ease and the control of her intrinsic muscles was very much improved.

Acquired spastic paraplegia.—The patients in this group include those suffering from disseminated or lateral sclerosis.

Excellent	2 (50 per cent)
Good	2 (50 per cent)
Poor	*nil*
No result at all	*nil*

Excellent or good results were obtained in 100 per cent, but the numbers are too small to be reliable. From my records I know that other patients did not obtain satisfactory results, but I performed many experimental operations in practically hopeless conditions. In lateral sclerosis there is no hope of obtaining results if the cerebrospinal pathways are sclerosed and incapable of transmitting motor impulses.

Parkinsonian rigidity.—Twenty-two patients replied as follows:

Excellent	1 (4.5 per cent)
Good	5 (22.7 per cent)
Poor	9 (40.76 per cent)
No result at all	7 (31.7 per cent)

Some result was obtained in 68 per cent of these patients and an excellent or good result in 27 per cent. The large returns for "poor" or "no result at all" are due to the effects of the progressive sclerosis which is associated with this disease. There are changes in reflex activity and in movement after ramisection, and these remain, but the patient gradually loses initiative, and it is this mental change which modifies the practical result. The tremor of paralysis agitans is modified only, but not removed, by ramisection.

Chronic constipation and megalocolon in adults.—

	Chronic Constipation	*Megalocolon*
Excellent	1 (50%)	2 (66%)
Good	1 (50%)	1 (33%)
Poor	*nil*	*nil*
No result at all	*nil*	*nil*

An excellent or good result was obtained in 100 per cent in each class of disease.

The operative treatment of chronic constipation and Hirschsprung's disease followed my observations made in patients suffering from spastic paralysis. These spastic patients are commonly constipated, and the results following ramisection were so striking that Dr. R. B. Wade applied a modified ramisection to the condition known as Hirschsprung's disease in children.[2] I have operated on five adult patients—three with dilated large bowel and two with chronic constipation. The following two histories indicate the condition before and after operation.

CASE 1

This patient, a female, aged 28, had always been constipated. Four "alophen" pills would produce only a slight movement of the bowel. She stated that it was usual for her to have an interval of eight days between motions. She had always suffered with indigestion. She complained of ill-health and inability to perform her household duties.

On examination her knee-jerks were found to be hyperexcitable, with slow relaxation, and there were no oscillations. This was more apparent on the right side than on the left, and was taken as evidence of sympathetic hyperactivity.

A modified left lumbar sympathetic ramisection was performed on October 24, 1929. On December 3rd she had very much improved; she had lost the pain in her back and the movements of her bowel were normal. When seen on May 7, 1930, she stated that she had gained a stone in weight, that she had not taken any aperients for over six months, and that she was feeling particularly well.

CASE 2

The patient, aged 58, complained of fatigue, slight nausea, and sleeplessness. He stated that at times he had previously been constipated for ten to fourteen days. On the last occasion four weeks had elapsed since he had had a normal motion. These attacks had occurred about every four months for the last twenty years. He had had tonsillitis as a child and malaria when 40 years of age. Appendicectomy had been performed at the age of 47, and his tonsils and devitalized teeth had been re-

moved one year later. His basal metabolic rate was +22. The patient stated that he felt mentally fatigued and hazy during attacks. No abnormality was discovered in the urine. Radiological examination showed a dilated pelvic colon. The reflexes were hyperexcitable and retarded in relaxation. He had a very bad colour and perspired freely.

A modified sympathetic ramisection was performed on May 6, 1930. He was given an aperient which caused a motion on the second day. Since then he has had a motion every day. An interesting point is that the reflexes returned to normal after operation, and the patient has lost what he described as haziness in his mental outlook.

SARCOMA OF THE FEMUR

The effect of ramisection on the lymphatic circulation is illustrated in a patient suffering from a sarcoma of the lower end of the femur.

In this patient amputation of the limb was considered useless owing to the x-ray appearances of the tumour and the duration of its growth. The patient suffered extreme pain. This was completely relieved by sympathetic ramisection, and there was, in addition, a shrinkage of the tumour. Shrinkage was so rapid that it could be due only to improvement in the lymphatic circulation. Before operation the growth measured 38 cm. in circumference, and on the afternoon following operation 36.5 cm. Eleven days after operation it measured 34.8 cm. Secondary growths in the inguinal region then appeared and involved the blood vessels, particularly the veins and lymphatics, and the growth gradually increased in size, though it did not attain the size it was before operation. The patient died about three months after operation. Professor Welsh, of the University of Sydney, reported the growth to be a fibro-sarcoma.

RAYNAUD'S DISEASE AND BUERGER'S DISEASE

Thirteen patients replied as follows:

	Raynaud's Disease	*Buerger's Disease*
Excellent	5 (71%)	4 (66%)
Good	2 (28%)	*nil*
Poor	*nil*	2 (33%)
No result at all	*nil*	*nil*

An excellent or good result was obtained in 100 per cent in Raynaud's disease and in 66 per cent in Buerger's disease.

A constant and most obvious change that follows ramisection is vaso-dilatation. This was described by me in my first paper, and the observation was used by Adson and Brown in their application of a modification of ramisection in Raynaud's disease. The sympathetic supply to a lower limb may be entirely removed by dividing the laterally directed rami to the second, third, and fourth lumbar nerves, and by dividing the lumbar sympathetic trunk at the level of the fourth lumbar vertebra. What is the reason, therefore, for removing part of the nerve supply of the bladder and bowel at the same time? The necessity for opening the peritoneum is also not obvious, but it is done by some surgeons as a routine procedure. It is a more dangerous and shock-producing operation, and is accompanied by a higher death rate than operations by the lumbar route.

I have operated in seven instances for Raynaud's disease with successful results, and in six instances upon patients with thrombo-angiitis obliterans with successful results in four.

WRITER'S CRAMP

Writer's cramp is a condition which can be treated by surgery of the sympathetic nervous system, as illustrated by the following case history.

The patient complained of inability to write. This was due to retraction of the hand controlling the pen. When he attempted to write, the thumb and wrist flexed, and this movement was accompanied by severe pain. The onset had been sudden, and had occurred seventeen years previously.

A thoracic sympathetic trunk section was carried out in August, 1928, and the pain and spasm immediately disappeared. At the end of six months he was able to write from two to four hours a day. The character of his writing also improved. In June, 1930, he wrote: "I can write more freely and for long periods. The pain and spasm have completely left me."

From this result it may be expected that the condition known as "telegraphist's cramp" may be successfully treated by operation on the sympathetic nervous system.

ANTERIOR POLIOMYELITIS

The application of sympathetic ramisection to the paralysis left by anterior poliomyelitis leads to satisfactory results as far as the paralysis is concerned. There was definite increase in power in one or two instances. In one instance, in answer to the questionary, the parent of the patient classified the result as "good," stating that there was little difference in the size of the two lower limbs compared with what there had been, that her circulation had improved, and that she was walking much better. There are, in my opinion, very few instances, however, in which the operation of sympathetic ramisection could be applied to anterior poliomyelitis, but there are perhaps a few in which general weakness of a limb could be improved by increasing the blood supply.

CONDITIONS SIMULATING TIC DOULOUREUX

A patient, aged 9 years, complained of pain in the right side of the face for a period of two years. The pain was not constant, but occurred in severe exacerbations two or three times a week, and was referred to the

distribution of the trigeminal nerve. During attacks the face became flushed, and the flushing was accompanied by excessive lacrimal secretion and secretion from the right side of the nose. Eating often precipitated a spasm, but at other times it came on from no obvious cause. He also complained of pain in the lower end of the spine when the pain in the face was present. The pain was agonizing and made the patient cry. After the pain had passed off the patient felt cold, and passed quantities of light-coloured urine.

On examination the face was a little more sensitive on the right side. X-ray examination of skull, pelvis, and jaw showed no evidence of any pathological change, and the patient's serum did not react to the Wassermann test.

Thoracic sympathetic trunk section was performed on February 13, 1930, and this was followed by attacks which gradually increased in severity and number. He had nine attacks in two weeks. The attacks then ceased, and he has had none since. The patient has now been free from pain for over six months.

The diagnosis of this condition may be disputed on account of the age of the patient, but the pain was referred to the trigeminal supply. The attacks did not cease immediately; this may be explained on the basis of paralysis of circulation and increased congestion following division of sympathetic nerves to one side of the head.

UNUSUAL VASO-SPASTIC CONDITIONS

The following two case reports relate facts that are not usually described in medical literature.

CASE 1

The patient was a girl of 14 years of age, who had sudden pain in her right foot two and a half years ago. This was accompanied by swelling of the foot and leg. The first attack lasted for three weeks and disappeared as suddenly as it came on. Occasionally she had been two months at a time without symptoms, but she had a prolonged attack in 1929—from February to May. For the last six months pain and swelling had been present every two or three days. The attack prior to operation had lasted seven weeks.

On examination pulsation was felt in the posterior tibial and anterior tibial arteries at the ankle. The deep reflexes were hyperexcitable and prolonged in relaxation on the right side, normal on the left. The right lower limb was cold, and there was excessive vasomotor tone, as evidenced by the slow return of colour after the removal of pressure.

Sympathetic ramisection of the right lower limb was performed on May 10, 1930. This was followed by an immediate cessation of pain and disappearance of swelling. There has been no recurrence of her symptoms since the operation.

CASE 2

For about two years this patient had suffered from coldness in the left lower limb. The right lower limb was also affected, but not so badly. This prevented the patient from sleeping at night, and was accompanied by a feeling of heaviness and profuse perspiration. The condition had been treated elsewhere as neuritis. Exercise made the leg warmer, but it became cold soon after the patient rested.

Left lumbar sympathetic ramisection was performed on October 2, 1929. This was followed by immediate relief and cessation of perspiration and coldness. The right lower limb also improved as a result of operative treatment of the left side. Improvement has been maintained up to the present time.

RETINITIS PIGMENTOSA

The latest, and a most important, application in surgery of the sympathetic nervous system is in the treatment of blindness associated with retinitis pigmentosa. This disease is characterized by degeneration of the retinal tissues and an accumulation of pigment in the substance of the retina consequent upon degeneration and constriction of the retinal vessels. The idea that the disease is caused by degeneration of the retinal vessels is supported by experimental evidence. Another suggested cause is that the disease is due to a primary degeneration of nerve tissue, but it is doubtful that this occurs apart from some alteration in blood supply.

The subjective signs of the disease are: (1) night-blindness; (2) loss of visual acuity; (3) contraction of fields of vision; (4) in advanced cases total blindness.

My attention was first directed to the pathological changes in the blood vessels in this disease by Dr. Lawrence, ophthalmic surgeon of Melbourne, and I thought that, as division of the sympathetic supply of the eye would permanently dilate the vessels, the conditions underlying the disease might be altered with beneficial effect. Dr. E. A. Brearley, ophthalmic surgeon of Sydney, sent me the patients and examined them after treatment.

The operation I carried out upon these patients was thoracic sympathetic trunk section, and consisted in dividing the sympathetic trunk just about the level of the second thoracic ganglion. This operation has been described elsewhere.[3]

The first patient underwent operation on May 29, 1930. During the week after operation he did not improve, but since then there has been steady improvement in the acuity of vision and in the enlargement of the fields of vision. The patient had had retinitis pigmentosa for the past ten years. Prior to operation he could not see clearly; everything was misty; for example, he could not see fingers moving at a distance of four feet. He was totally blind in the dark. He had suffered from blepharospasm of the right eye for three months prior to operation. Two weeks after operation he could tell the time on a clock with a two-inch dial, black figures on a white ground. He could also distinguish fingers moving at a distance of four feet. On June 18th he was very much improved; he could read letters half an inch high and the face of an alarm clock with a four-inch dial at a distance of eight feet. On June 24th he reported that the fields of vision were enlarged and that the vision of the left eye was also improved, although the right thoracic sympathetic trunk only was divided in the operation. He also reported

that he could read small print in a good light. The blepharospasm disappeared.

The other four patients have also had some improvement in the acuity of vision and enlargement of the fields of vision, but it is too early to state the results accurately excepting in one instance, in which the field of vision was enlarged three times in a month.

REFERENCES

1. ROYLE, *Med. J. Australia*, Jan. 26, 1927, 77.
2. WADE AND ROYLE, *Ibid.*, Jan. 29, 1927, 135.
3. ROYLE, *Ibid.*, Oct. 6, 1928, 436.

DISCUSSION

DR. J. R. LEARMONTH (Rochester, Minn., U.S.A.) emphasized that the action of both parasympathetic and sympathetic nerves upon the bowel and bladder should be regarded as a means of harmonizing an important physiological necessity—the disposal of the waste products of the body. Operations upon the sympathetic nerves of the bowel were indicated in cases of nervous imbalance, such as Hirschsprung's disease, and constipation due to dulling of the defæcation reflex. He described a new operation by which the whole sympathetic nerve supply to the lower colon, the rectum, and the internal anal sphincter could be interrupted, with preservation of the vasomotor nerves to the limbs. In the case of the bladder, he described two cases in which defective micturition, due to lesions affecting the parasympathetic pathway, had been rectified by division of the sympathetic nerves to the bladder, and advanced the hypothesis that these nerves might mediate an inhibitory action on the musculature of the human bladder. He also described cases of vesical dysfunction which had been benefited by removal of agents compressing the dural sac under a lumbar or sacral spina bifida occulta. The operation of total denervation of the bladder was also referred to and the indications for performing it were discussed.

DR. R. B. WADE (Sydney, N.S.W.) gave a commendably critical report of progress concerning the treatment of Hirschsprung's disease. He had carried out left-sided lumbar ramisections for this condition in fourteen cases, and had had striking improvement in all but one, with the establishment of regular bowel movements and normal control of the anal sphincter. The unsuccessful case responded temporarily, however, when the rami on the right side also were sectioned. The unilateral operation had been employed in many cases of chronic constipation with satisfying results.

DR. A. W. ADSON (Rochester, Minn., U.S.A.), who dealt with indications for, and the therapeutic value of, sympathetic ganglionectomy and trunk resection in the treatment of peripheral vascular diseases, mentioned the two existing theories concerning the origin of Raynaud's disease; one, upheld by Lewis, who maintained that the vascular spasm was due to a purely local condition in the tissues affected, while he, himself, and others contended that the disease resulted from hyperactivity of vaso-constrictor reflexes, and that the fault therefore lay in the central nervous system. He pointed out that in his cases, after complete removal of the vaso-constrictors supplying the lower limb, it was impossible to evoke vasomotor spasm, however intense the stimulus. The occasional persistence of spasm in the upper extremities was attributed to failure to remove all fibres. The more favourable results from the radical procedure recently introduced for the upper extremity supported this inference. At the Mayo Clinic the suitability of a case for operation was determined by a "vasomotor index"—that is, the ratio of the rise of temperature in the extremities to that in the mouth in fever produced by injection of typhoid vaccine. The speaker had also proved that retinal arteries dilated after thorico-cervical ramisection. In concluding, he showed his first case of Raynaud's disease operated on five years ago, which had remained free from symptoms during that period, and also a case of Buerger's disease in which the morbid process had been successfully arrested in the upper extremities two years previously.

DR. ROBERTSON (Toronto) described a case of spastic paralysis operated on in his clinic by Dr. Royle three years ago in which the result was distinctly favourable and had remained so. He also mentioned several cases of arthritis and of Hirschsprung's disease which had been successfully treated by ramisection.

DR. FLOTHOW (Seattle, Wash., U.S.A.) said that he had seen Dr. Royle's cases in Australia, and could confirm his claims. He then described a case in which some months after lumbar ramisection a cervical ganglionectomy was performed, and during the general hyperthermia (108° F.) which followed, the lower extremity, whose lumbar sympathetic chain had been removed, showed evidence of extreme vaso-constriction.

In a happy speech LORD MOYNIHAN drew attention to the high level of the discussion, and pointed out its relationship to the development of surgery in the past fifty years. Following upon the revolution effected by the work of Lister, surgeons had concerned themselves with the restoration of mechanical disorders by mechanical means. Surgery was now entering an era which might aptly be termed an era of physiological repair. The divorce of physiology and anatomy that supervened at the close of the career of Sharpey had been unfortunate, and its ill effects had persisted up to the present time. Lord Moynihan, however, seemed to discern the restoring hand of the surgeon. The synthetic action of surgeons, begun by Dr. Royle, was bringing physiology and anatomy together again, not by means of animal physiology, but by means of human physiology. The inaugural symptoms of disease should be studied by those who were conversant with normal physiology rather than with the pathology of the post-mortem room. For the philosopher this was the lesson offered by the day's meeting.

A CEREAL MIXTURE FOR CHILDREN.—F. F. Tisdall, T. G. H. Drake, and A. Brown introduce a new cereal of the following percentage composition: wheatmeal 53, oatmeal 18, corn meal 10, wheat germ 15, bone meal 2, dried brewers' yeast 1, and alfalfa 1. The ingredients are ground, mixed, and dried at a temperature of 70° C. for thirty minutes. The mixture will keep indefinitely; it is rich in calcium, iron, and copper. Vitamins A, B_1, B_2, D—from ultra-violet irradiation of the wheat germ in yeast—and E are present in appreciable quantity. The average infant and child consume from one to two ounces of the dry cereal per day. It has been used olmist exclusively for the past three months in the Hospital for Sick Children at Toronto. It is no different from the ordinary refined, finely milled cereals as regards its laxative or constipating effect, or in palatability.—*Am. J. Dis. Child.*, 1930, 791.

RENAL SYMPATHETICO-TONUS AND RENAL SYMPATHECTOMY*

BY S. HARRY HARRIS, M.D., CH.M., F.C.S.A., AND RICHARD G. S. HARRIS, M.B., CH.M.,

Sydney, Australia

UNTIL recent years little or no attention has been directed in surgical literature to the sympathetic nervous system in its relationship to the urinary tract. That sympathetico-tonus has a definite place as an etiological factor in the pathology and morbidity of the urinary tract has not, we believe, up to the present time, been sufficiently recognized. It has seemed desirable, therefore, to place on record some observations gleaned from our Urological Clinic at the Lewisham Hospital during the past four years, which, it is believed, clearly demonstrate the significance of renal sympathetico-tonus as a definitely recognizable clinical and pathological entity.

Nearly four years ago our attention was directed to the possibility of a neuropathic basis in a considerable number of patients suffering from varying grades of renal pain, in whom a full urological study revealed little or no gross abnormality. In fact, with the exception of a positive pain reproduction test, delay in emptying of the pyelographic medium, and possibly slight clubbing of the renal calices and dilatation of the pelvis, essentially normal renal findings were the rule. Patients of this type were allowed to drift without the institution of any active treatment, though occasionally exploratory operation, or even nephrectomy, was demanded for the relief of pain. We decided to submit one of these patients to a denervation of the kidney, in the hope that this might afford the desired relief. The result of this operation exceeded our most sanguine expectations, and from that time to the present we have performed it on 28 patients with the greatest satisfaction, and, so far as it has been possible to determine, without any recurrence of pain, though in one patient the operation had to be done at a later date on the opposite kidney. The name of "renal sympathectomy" has been applied, more or less accurately, to this operation. It is noteworthy that there was associated in some of these cases generalized sympathetico-tonus, which in three patients was most marked on the side of the lesion, *e.g.*, increased excitability of the knee-jerks and delayed relaxation-time in the lower limb of the same side. When this occurs it is a collateral diagnostic sign of considerable importance.

In addition to the above group of cases for which the operation was essentially devised we have performed renal sympathectomy on one patient with so-called "essential" hæmaturia, and on one patient with parenchymatous nephritis. The former patient was admitted to Lewisham Hospital with a long-standing history of very persistent hæmaturia, which, as repeated investigation showed, came from the right kidney. Operation was undertaken on the hypothesis that there was spasticity of one, or possibly more, of the papillary ring-muscles surrounding the base of the papilla with consequent venous engorgement of the papilla and hæmaturia, and that this condition might be relieved by sympathectomy. At that time we had not adopted pyeloscopy, and no proof of this assumption was forthcoming. However, the operation was completely successful, and there has been no recurrence of bleeding for now more than fourteen months. The patient with parenchymatous nephritis was referred to the Urological Department at Lewisham Hospital as she was rapidly losing ground, despite intensive medical treatment. Both kidneys were operated on, with three months' interval between the operations. The result, in the year that has elapsed since the first operation, has proved most satisfactory to all concerned.

We merely desire here to place these two cases on record with a view to future investigation. Animal experiments are being carried on by one of us which will be recorded at a later date. Meanwhile it is hoped that interest in other quarters will be stimulated.

---

* Read for the authors by Lord Moynihan at the combined meeting of the British and Canadian Medical Associations, Winnipeg, August 29, 1930, in the Section of Surgery.

From the Urological Department of the Lewisham Hospital, Sydney.

From a physiological point of view, so far as the secretory activity of the kidney is concerned, the operation is harmless; and it is probable that in some diseased conditions of the renal parenchyma considerable benefit will accrue from the ensuing vaso-dilatation and improved circulation. Since the introduction of pyeloscopy into our clinic, the reason for the success of renal sympathectomy in our early cases has become evident, and the indications for its use have become more clearly defined.

INDICATIONS FOR RENAL SYMPATHECTOMY

The pyeloscopic and pyelographic indications for renal sympathectomy* (and presumptive evidence also of the existence of renal sympathetico-tonus), so far as the present state of our knowledge permits us to determine, fall broadly into three groups:—

Group (a).—*Irregular and incomplete contractions of the calices and renal pelvis, so that the impulse for peristalsis either does not reach or does not pass beyond the uretero-pelvic junction. Delayed emptying time is a natural corollary.**

This group is characterized by intermittent colicky pain, generally, though not necessarily, of a moderate grade of severity. The condition is really one of fibrillation, closely akin to auricular fibrillation in the heart. It arises probably from a neurogenic spasm or obstruction of the necks of the calices or uretero-pelvic junction.

The researches of Max Brödel, quoted by Kelly and Burnam in their work on "Diseases of the Kidneys, Ureters and Bladder", have shown that there is a series of ring-muscles encircling the bases of the papillæ, the necks of the minor calices and the necks of the major calices, and a stronger muscle at the uretero-pelvic junction, in addition to others in the lower ureter (*vide* Fig. 1). As these muscles, like any other sphincter, are normally in a state of tonic contraction, sympathetico-tonus makes their relaxation difficult, *i.e.*, induces a condition of spasm. This leads to increased tone of the muscles of the pelvis and calices and to increased intra-pelvic pressure. As the sympathetic nerves fix posture, both in relaxation and in contraction, the irregularity of the contractions which characterizes this condition is probably due to an impulse for contraction breaking through this inhibition at different points.

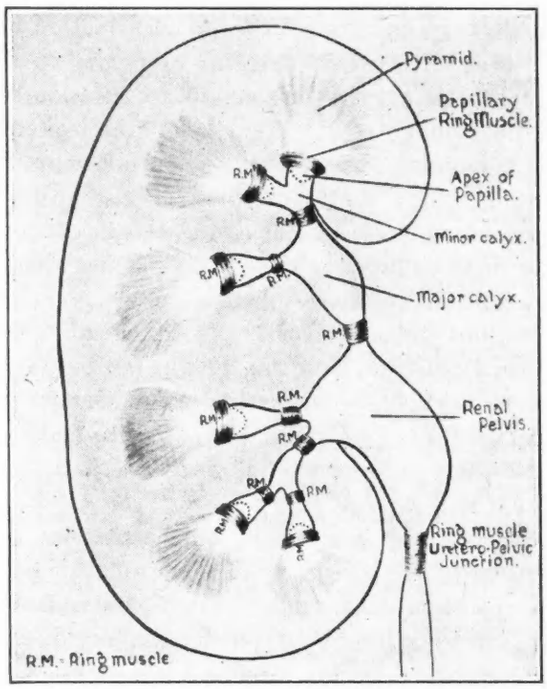


FIG. 1.—Ring-muscle system of the renal pelvis and calices, after Max Brödel ("Diseases of the Kidneys, Ureters and Bladder", Kelly and Burnam).

Just as in the case of voluntary muscle, as the work of Royle has shown, the characteristic that is conferred by sympathetic ramisection is the ability to relax, so relief is afforded by renal sympathectomy because the inhibiting influence is cut out, and there is no factor interfering with movement. In plain language, overaction of the sympathetic nervous system on the musculature of the renal pelvis, calices and ureter impedes their movements and makes them difficult, induces increased intra-pelvic and intra-calical tension, and causes pain. Renal sympathectomy removes this impediment, with resultant lowering of tension and relief of pain. It is essential for the success of renal sympathectomy, however, that any organic obstruction of the ureter should, if present, be removed, otherwise the contractions will still be inefficient, and the condition of fibrillation will still persist.

The association of the two conditions (*i.e.*, neurogenic and organic obstruction) is by no

* The normal sequence is for the calices to contract in regular order from above downwards, followed by contraction of the renal pelvis, which institutes a peristaltic wave in the ureter, which in turn is propagated into the bladder. The normal emptying time with an aqueous pyelographic medium does not exceed ten to twelve minutes.

means uncommon, and two of our patients with well marked ureteral stricture required renal sympathectomy to complete the cure, even after full dilatation of the stricture had been accomplished.

It is *sine qua non* that the presence of organic ureteral obstruction be eliminated before drawing conclusions from the pyeloscopic and pyelographic examinations.

Group (b).—*Marked slowing down with irregularity and increased power of the contractions, associated generally with dilatation of the renal pelvis and clubbing of the calices. Delayed emptying time is a feature here also.*

Clinically, this group is characterized by more persistent dull pain, with liability to acute exacerbations. Relief of the obstruction is followed by disappearance of the clubbing of the calices, at any rate in early cases, for here the papilla is merely forced out of the calyx by the increased intra-pelvic pressure, and returns to its normal position on relief of this pressure. Though definite proof is at present lacking, it is probable that the findings in this group represent a later stage of group (a), though patients may remain in group (a) for many years without showing signs of dilatation of the pelvis or calices.

The above is the presumptive explanation of the origin of many cases of hydronephrosis which occur without evident cause. The condition has a close analogy to Hirschsprung's disease of the large bowel, or megacolon.

This type of obstruction and its attendant pain are sometimes very effectually and immediately relieved, at any rate temporarily, by the hypodermic injection of eserin, the regular exhibition of which for more or less prolonged periods sometimes induces well co-ordinated, firm contractions which are readily demonstrated by pyeloscopy. The recurrence of symptoms after temporary relief by eserin is a very definite indication for renal sympathectomy.

The use of eserin for inducing contractions of the renal pelvis was first suggested to us by Dr. Leon Jona, of Melbourne, and will, we believe, prove of very great value in some of these cases. Our experience, however, is too recent to warrant dogmatism in this regard.

Group (c)—*Dilatation and immobility of a single calyx, and its delayed emptying.*

This condition has been found in two of our recent cases and is included here as a third group, though it is probably merely a variant of group (b).

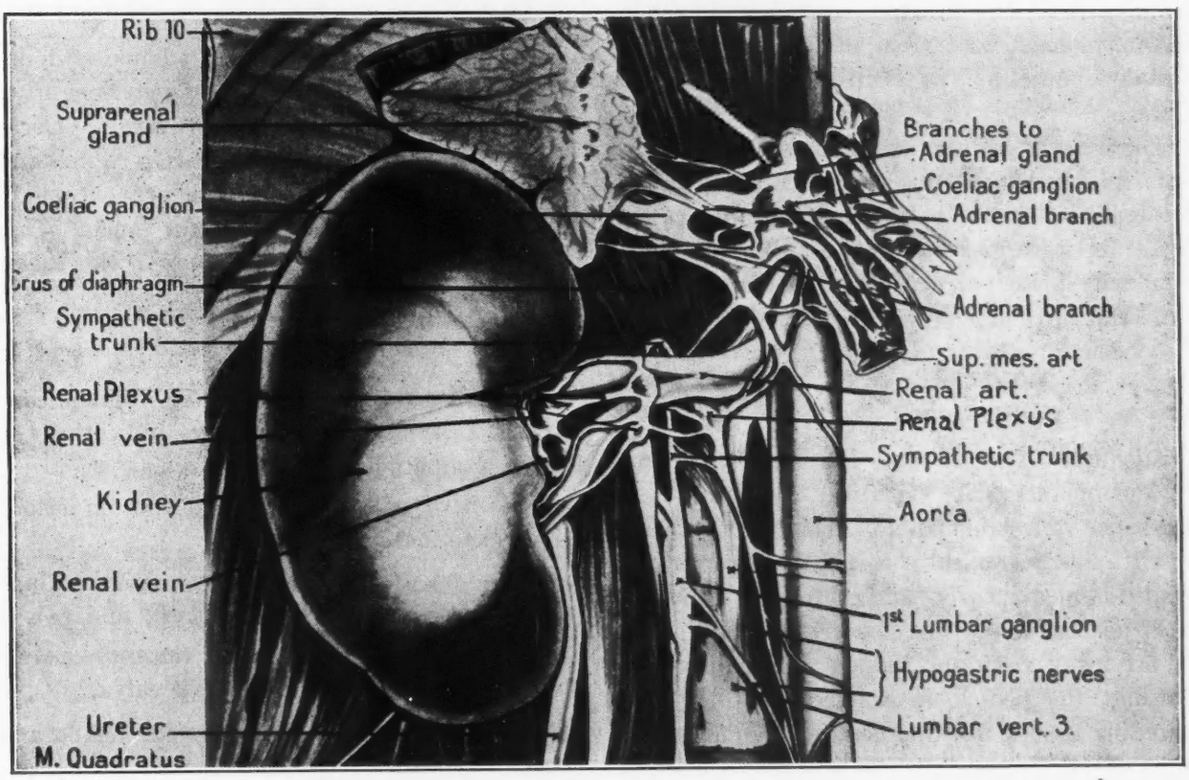


FIG. 2.—Nerve supply of the kidney. Photograph of a dissection in the Department of Anatomy of the Medical School of the University of Sydney.

On pyeloscopy, it was found in these two patients that the renal pelvis and unaffected calices filled in the normal way, *i.e.*, the pelvis first, and the calices progressively and more or less simultaneously from the pelvis outwards. The affected calyx, however, did not begin to fill until the remaining calices were completely outlined, and, on filling, this calyx was definitely clubbed. During the progress of pyeloscopy it remained, to all intents and purposes, completely immobile, and the neck of the calyx remained invisible throughout, probably in a state of spasm. The involved calyx was still distended after a lapse of twenty minutes, long after the remaining calices and pelvis had discharged the medium. Though no operation has yet been undertaken in these two patients, it is a reasonable assumption that the lesion is one of localized sympathetico-tonus.

THE NERVE SUPPLY OF THE KIDNEY

The nerve supply of the kidney (*vide* Fig. 2) is derived from the plexus renalis, which is a branch of the cœliac plexus. The former receives also a direct branch from the nervus splanchnicus minor, which has its origin from the tenth to the twelfth thoracic ganglia, and a branch from the suprarenal plexus. The kidney, therefore, probably has a double innervation, namely, both from the sympathetic and para-sympathetic (*i.e.*, through the vagus) systems.

There is a definite nerve arising from the renal plexus which runs along the posterior inferior aspect of the pelvis and accompanies the ureter in its upper part. This is the so-called "superior principal nerve" of the ureter. The "inferior principal nerve" arises from the hypogastric plexus.

OPERATIVE TECHNIQUE

Adequate exposure and illumination of the field of operation are essential; the operation is otherwise quite impossible. The kidney is exposed extra-peritoneally through a boomerang-shaped lumbar incision, and completely delivered from its fascial and fatty coverings. Beginning as far away from the kidney as is reasonably possible, the pedicle is isolated from the surrounding tissues, *working continuously outwards towards the kidney*. It considerably simplifies the operation when the pedicle can be attacked at some distance from the kidney before the vessels commence to branch. Where the kidney can be completely delivered this is a comparatively easy matter, but in the case of a very short pedicle it may be impossible, and the dissection will have to begin closer to the hilum of the kidney and be carried out in the depths of the operative field.

Cleaning up the pedicle by gauze dissection from the kidney *inwards*, as advised by Papin in his work on "Operations of the Kidney", we have found to be fraught with great danger of tearing the fine branches of the renal artery and vein. The hæmorrhage from this source may be exceedingly difficult to control and necessitate nephrectomy. After the pedicle has been isolated the individual vessels are attacked in turn by careful instrumental dissection, beginning on whichever aspect of the pedicle affords the most ready access, and always working in the direction of the kidney. Each vessel is completely denuded of connective tissue, and all tissue lying between the vessels is removed. The renal pelvis, on both aspects, as far as the hilum, the uretero-pelvic-junction, and the first inch of the ureter are also cleaned up, the superior ureteral nerve being divided in the process. Finally, the kidney is attached solely by its denuded vessels and ureter.

The operation is extremely tedious, and demands painstaking care. A complete operation alone will insure a satisfactory result. Occasional cases will be encountered in which the tissues surrounding the pedicle are extremely fragile and bleed at the slightest touch. This occurred once during the currency of this series and rendered the operation impossible.

SUMMARY

It is believed that the following findings constitute a syndrome definitely indicative of "renal sympathetico-tonus":—

1. Positive pain reproduction test on cystoscopic examination.

2. Positive pyeloscopic and pyelographic findings as described in groups (a), (b) and (c).

3. Delayed emptying time of the renal pelvis and calices, or possibly of a single calyx.

4. Recurrence of pain after its temporary relief by eserin.

5. Evidence of generalized sympathetico-

tonus, which may be most marked on the side of the lesion.

6. Negative urinary findings on microscopic and cultural examinations.

7. Proved absence of organic ureteral stricture.

CONCLUSIONS

The operation of "renal sympathectomy" may be undertaken, in the presence of the above mentioned findings with the confident anticipation of complete and permanent relief of pain.

Whether the operation will find a place in the treatment of so-called "essential" hæmaturia and of some types of nephritis remains yet to be proved.

SLEEP AND ITS DISORDERS IN CHILDHOOD*

BY HECTOR CHARLES CAMERON, M.D., F.R.C.P.,

Physician in Charge of the Department for Diseases of Children, Guy's Hospital, London, Eng.

OF the physiology of sleep we know no more than of its pathology. Speculations as to its nature, what part is played by variations in vascularity, in blood pressure, or in osmotic pressure, whether or not there exists a sleep centre acted upon by a hypnotoxin elaborated during the hours of wakefulness, how far the endocrine glands control the process—all such speculations afford us no help in solving the problems of sleep and its disorders in childhood.

In our discussion, therefore, we can only approach the subject with certainty from the purely clinical standpoint. We can only depict disturbances as we find them in practice, and discuss the ways and means whereby they may be combated. Views on etiology must be regarded as wholly speculative. I propose to discuss briefly in turn four examples of such disturbances.

1. Sleeplessness and continuous crying in young infants.
2. Sleeplessness in older children.
3. Night terrors.
4. Enuresis.

SLEEPLESSNESS IN YOUNG INFANTS

Three factors may be concerned in different cases in varying degree in producing this most unhappy state: (*a*) pain or discomfort, (*b*) inherited or constitutional neuropathy, (*c*) faulty management.

Pain or Discomfort.—In a few cases the unrest is caused by persistent pain. Syphilitic periostitis, the subperiosteal hæmorrhages of scurvy, uric acid calculi, otitis media, for example, must not be overlooked. The pains of dyspepsia are a more common cause. In intestinal colic the pain is caused by the increased vigour of the peristaltic contractions of the intestine, and is associated with the passage of a green, watery, or slimy stool, which is expelled violently from the anus with the audible escape of flatus and fluid, and which may be so irritating that it causes excoriation of the skin of the buttocks. Aerophagy, with distension of the stomach, is an even more common cause of abdominal discomfort. But here, as so often happens in infancy, cause and effect are hard to separate, and we are confronted with a vicious circle of symptoms, each productive of the other. The infant, in the first months of life, functions almost solely as a suction apparatus. That apparatus is effective only when the child is at rest, quiet, perhaps even drowsy. The suction act is not a voluntary but a reflex act, and the reflex is inhibited by emotional unrest. Brought to the breast sleepless, crying, and excited, the child, as it were, stammers in its attempt at suction. It substitutes a voluntary, inco-ordinate, ineffective effort for the quiet, sustained, effective suction. Gulping, straining, and choking, it secures from the breast a minimum of milk and a maximum of air. The consequent distension of the stomach is painful. The delayed peristaltic contraction of the fundus—a property of the infant's stomach which expels that

* Read in opening a discussion in the Section of Diseases of Children at the combined meeting of the British and Canadian Medical Associations, Winnipeg, August 29, 1930.

amount of air which is always and inevitably swallowed with the milk—is incapable of achieving its purpose. Either eructation is prevented by the over-distension, or eructation is so violent that the fluid contents of the stomach are ejected as well as the air. To prevent "wind" we must secure sleep; to secure sleep we must prevent "wind." The infant must be brought to the breast quiet and controlled, not in a state of emotional excitement. A single grain of chloral hydrate, given ten minutes before each of five or six feeds, for some days, will often prevent wind. When the infant is quiet and drowsy the suction reflex comes into its own again; a full meal is taken without too great aerophagy, and sound sleep follows.

Nasal obstruction from nasal catarrh is one of the most frequent causes of discomfort leading to wakefulness. Not only does the cough constantly waken the child, but the consequent nasal obstruction interferes with suction. The infant must stop breathing in order to suck, must stop sucking in order to breathe. Aerophagy and insufficient stimulation of the breast are direct results of nasal obstruction. The two commonest causes for a failure of lactation in the first months are to be found in nervous unrest in the infant, leading to inco-ordinate ineffective suction, and to nasal obstruction in the infant, which in turn is a cause of nervous unrest. A tampon of cotton-wool, which allows a few drops of adrenaline solution (1 in 5,000) to flow backwards through the nostrils before the child is put to the breast, may break the vicious circle, permit nasal breathing and effective suction, and thereby prevent aerophagy and hunger, with the consequent insomnia and crying.

Inherited Neuropathy.—The neuropathic infant generally bears in his face and aspect the stamp of his inheritance—thin, meagre, and tense, with rigid face and limbs. His hands are constantly clenched; often there is opisthotonos. The outline of the recti abdominis is visible on the retracted abdomen. The scalp is usually hairy, and the hair is lank and dark, generally massed on the vertex, thin and sparse on the temples. The slightest sound in the neighbourhood awakes him with a characteristic start. Instantly the anxious expression flows back into his face, and the inevitable crying begins. The response to the approach of a friendly face is not a smile, but a cry or a frown.

Faulty Management.—Only a few restless babies suffer from inherited neuropathy. Most infants who are sleepless and who cry constantly without any specific pain or discomfort do so because the management is at fault. The competence of a mother in handling her infant varies directly with the degree of her own self-confidence. It is through the mother or the nurse that we must work to get our effects. No infant lies quiet in the arms of a woman who is herself in a state of nervous tension. In hospitals and institutions infants sleep all the time, because they are subjected to little, perhaps to too little, psychical stimulation. They are cared for by a succession of kindly, capable young women, who are not apt to be unduly distressed by the crying of a child. In an institution the baby does not pass his time under the searchlight of his mother's face and eyes, with a constant interplay between the two—coaxing, appealing, consoling, urging, on the part of the mother—straining, striving, refusing, resisting, on the part of the child. This excessive psychical stimulus may be the cause of a restless state of fatigue. Insomnia and constant crying may follow and become persistent when the mother grows agitated and worried by the failure of her renewed attempts to dominate the opposition of the child. The best place for such an infant may be up against the mother's back, against a warm, comfortable part of her body, which takes no part in the expression of her emotions, when the searchlight of face and eyes is directed away from the child, and when her hands are free to busy themselves in occupations which divert her thoughts from the child. For when her thoughts are so diverted, peace may come, almost miraculously. The mother's agitation and the infant's restlessness may act and react upon each other in such a way that treatment, if it is to be successful, must have regard to both aspects of the problem.

Chloral is, I believe, the most effective and the most satisfactory hypnotic in infancy. A prolonged hot bath or a hot pack is often as helpful for the restless infant as it is for the adult, who in a state of acute maniacal excitement may show symptoms not dissimilar. The swaddling-clothes, too, with which primitive folk in all countries and all ages have encumbered the

young infant are the infantile strait-waistcoat. When enveloped in the steady pressure of a light and porous shawl, so that, like Wordsworth's cloud "it moveth altogether, if it move at all," many a restless infant will fall soundly asleep. The practice of carrying an infant always upon a supporting pillow has this, perhaps, to explain its popularity—that the pillow serves to insulate the tense nervous system of the agitated mother from that of the child, and prevents the incessant struggle between the restless movements of the child and the restraining hold of the mother.

SLEEPLESSNESS IN OLDER CHILDREN

In older children sleep is often still intimately dependent upon the support which the child derives or fails to derive from the mother. Many nervous children will sleep only in the presence of the mother. The so-called "calling out," a persistent hailing of the mother, as soon as the light is turned out and the child is left alone, is caused by the effect upon the child of the ill-concealed agitation in the mother. The parents of children who cry incessantly are apt to be sensitive persons who are unnecessarily disturbed by the cry. Many children, like moths to the candle, are compelled to exploit these emotional reactions in their parents. Refusal of food and refusal of sleep have here the same origin.

To urge a child to go to sleep is only to call attention to his own impotence in the matter. No one can go to sleep by an effort of will, and the sense of this inability is a main cause of all insomnia. A conscious effort to achieve sleep prevents sleep. On the other hand, to speak before a child of his remarkable capacity for immediate and sound sleep, to encourage the tendency natural to many children to associate sleep with certain treasured objects—the disreputable remains, perhaps, of what was once a teddy bear—to lay stress upon improvement, to make light of occasional wakefulness, is to provide helpful management. All children are at times wakeful, at times refuse food, at times wet the bed, but whether these failures are transitory and of no importance, or whether they are erected into formidable disorders, depends more than anything else upon the mother and her power to hide her own anxiety. It is the mother bird that by its warning note arouses the sense of fear and of danger in her young. Comfortable, easy-going persons, who always hope for the best, seldom find their children refusing either to eat or to sleep. There are many other points of management on the importance of which we are all agreed, but which time will not allow me to deal with. The need for adequate ventilation and for warmth can hardly be overstressed. A heavy and indigestible meal taken late at night has caused many a sleepless night. Lack of exercise no less than fatigue may cause insomnia. In a given case we must review all the circumstances of the child's life and search for the contributory causes.

THE UNSTABLE METABOLISM OF THE NERVOUS CHILD

But when I turn from a consideration of the important part which management plays and examine the causes of insomnia which are peculiar to the child himself, I find myself on more debatable ground. One particular aspect of the sleep question in older children I should like to deal with in some detail, because it concerns very intimately, I think, the consideration of those particular disorders of which I am to speak—namely, night terrors and enuresis.

The metabolism of all children, just because they are children, is less stable than that of later life. In some nervous children this instability is a characteristic and striking peculiarity. It is not that there is any abnormality peculiar to the nervous child, but rather that biochemical reactions common to all and which do not overstep normal limits may be provocative of symptoms of great and sometimes of alarming severity.

Biochemists tell us that all the energy expended both upon muscular exertion and upon the activities of our emotional life is derived primarily from the burning of carbohydrate. In children, starvation, pyrexia, exertion, and emotional excitement, whether pleasurable or painful, tend much more readily than in adults to exhaust that meagre reserve of carbohydrate which is stored as glycogen partly in the liver and partly in the muscles. In the absence of sufficient available carbohydrate, the metabolism is apt to become disturbed, and the evidence of this disturbance is found in a fall in the blood sugar, in an accumulation of ketone bodies in the blood, in a greater excretion of nitrogen, and

in an increased accumulation of fat with a diminished content of glycogen in the liver. When the carbohydrate level is at the lowest end of the range the body appears to endeavour to achieve the synthesis of sugar out of the ample store of body fat, which is our main reserve of energy. It is a view widely held at the present time that the presence of ketone bodies in the blood in considerable amounts indicates the failure of such an attempt. Some sugar is indeed successfully derived from fat, but much of the synthesis is incomplete, and remains, as it were, at the stage of the ketone bodies. Ketonæmia, in other words, may perhaps be regarded as evidence of a failure to complete the synthesis of the necessary sugar from the stored body fat.

Individual children differ widely in their reaction to the presence of ketone bodies in the blood and to the accompanying hypoglycæmia. The nervous child, slender, thin, and pale, with his eager or too anxious expression, with a tendency to "bouts" or "turns" or "attacks," sometimes characterized by severe and incessant vomiting, but more often merely by an increased restlessness, irritability, and exhaustion, by obscure pyrexia, by anorexia, or nausea, by yawning, pallor, and a variety of vague muscular aches and pains, as well as by confused or terror-stricken dreams, has, as has long been recognized, a low tolerance for fat. It is, I think, clear from a clinical study of such cases that these sudden backslidings in physical energy and nervous control, associated often with clear evidence of hepatic inactivity, which the mother describes as bouts or turns, are the physical and nervous manifestations of the underlying disturbance of metabolism, produced by over-exertion, psychical shocks, or infective disturbances.

The reaction of young children to hypoglycæmia and ketonæmia, induced experimentally by starvation and by a diet with little sugar and a high content of fat, has recently been investigated and recorded in an interesting communication by Salomonsen. The author reviews at the same time the extensive literature on the subject of ketonæmia and hypoglycæmia. The application clinically of the work of Hilliger, Hecker, Frölich, Ross and Josephs, Cammidge, Osman and Close, and many others, presenting as it does much that is contradictory, has not yet been sufficiently defined or even sufficiently discussed.

Fifteen young children between the ages of 1 and 4 were subjected by Salomonsen to periods of starvation of from thirty-six to seventy-two hours. Within the first twenty-four hours there was invariably a rapid and extreme fall of the blood sugar; in several cases it fell below 0.04. Simultaneously the blood acetone rose from minimal amounts to figures which gave on an average nearly 0.2 part per 1,000.

Twelve children between the ages of 5 and 14 were suddenly put on a diet poor in carbohydrate and rich in fat. In both series symptoms were produced, the intensity of which varied very much in different individuals, but which comprised pallor, anorexia, somnolence, vomiting, loss of weight, increased excretion of nitrogen, hypoglycæmia, ketonuria, and sometimes a palpably enlarged liver. The author notes—and this is of especial interest in the present connection—that he was invariably able to predict which individual children would show a strongly marked reaction. Plump, well-coloured, placid children were, as a rule, little incommoded. But in the case of certain fragile, "neurolabile" children the different symptoms reached quite the same intensity as in a spontaneous attack of cyclical vomiting.

In these experiments we are furnished with evidence which supports the clinical observation that it is especially the nervous child who reacts most to stress, whether starvation, pyrexial infection, or emotional excitement.

HYPOGLYCÆMIA AND DISORDERS OF SLEEP

It is clear that that particular stress which in practice is most commonly the cause of an "attack" or "bout"—I mean excessive emotional excitement—is not capable of precise investigation in the laboratory, but the reaction of the children to hypoglycæmia, induced by starvation and by a diet with insufficient carbohydrate, is highly suggestive. Nor can the laboratory furnish us with proof of what seems to me equally true, that when the metabolism of the nervous child is under strain in this particular way, when we find hypoglycæmia and ketonæmia, we encounter always an exacerbation in all nervous symptoms. It is when the child is in this state of prostration, of muscular laxity, and of pallor that he is most irritable, least con-

trolled, and most apprehensive, and that the difficulties and struggles of the day are most likely to lead to sleeplessness, night terrors, or enuresis. As if even the physiological starvation of the night were ill tolerated at such times, we encounter a number of disturbances in nervous children which are confined to the night or undergo exacerbation in the night. In very many children with asthma, enuresis, sleep-walking, and night terrors, we may recognize the tell-tale smell of acetone in the breath. In all these conditions I believe that we may regard a low level of the blood sugar as, in some way, a cause or an indispensable part of the cause of the disturbance. The metabolism of the night differs from that of the day, because the blood sugar is at a low fasting level, and a higher proportion of the energy is derived from fat as shown by the respiratory quotient. Salomonsen found that the early morning urine always contained the highest proportion of acetone. This is in accordance with the common complaint of mothers of such children that they get up "at their worst," pale, yawning, and intensely irritable. Only after breakfast has provided the necessary carbohydrate is there improvement.

The sleep of certain children, whenever there is some degree of hypoglycæmia and ketonæmia, tends always, I think, to be abnormal. Confusion, unhappy delirium, muttering speech, restless movements, and terrifying dreams are then the after-effects of the emotions and excitements of the day.

Enuresis, in many cases I think, may be regarded as a specific night terror. It is not the child who does not care who wets the bed, but the child who cares too much, who goes to sleep fearing that the accident may happen, oppressed by the conviction that it will happen, dreaming that it does happen. As a rule he is intensely unhappy because of his failing. Sometimes, it is true, he hides his feelings and ostentatiously affects an air of unconcern. At times, too, in the interests of his daily life he does gain genuine relief. There may be intervals when he forgets it. Yet at times of exhaustion or depression the obsession is apt to return in all its old power, and these relapses are especially prone to recur in that state of pallor, prostration, irritability, and increased apprehensiveness which accompanies, and in itself indicates, a blood sugar at the lower levels of its range, ketonæmia, and an inactive liver.

I do not mean to deny in the least the importance of the psychological aspect of the problem, but, at the moment, that which I particularly wish to emphasize is the close association in childhood between mental states and states of metabolism. In the state which I have tried to describe I think that we find a powerful predisposing cause of disorders of sleep. In adults, alcohol may bring sleep because it brings courage —Dutch courage we call it—which turns the mind from worry, from the investment which has gone wrong to the investments which have succeeded; from the disappointments of the day to the hopes of to-morrow. When the blood sugar is low, the mind is apt to be agitated, restless, apprehensive. In such a case either sleep will not come to the child or sleep is light, and the unrest of mind is shown by moaning or muttering speech, by unhappy dreams, by night terrors, or by enuresis.

Rest, wise and understanding management, and a diet with a higher percentage of sugar and a somewhat lower percentage of fat, are the chief needs of the nervous child. It is interesting to speculate how far the introduction on a large scale into the dietary of man of the most easily assimilated food stuff—sugar—has been necessary to enable him to stand the strain and to combat the nervous exhaustion of the increased speed at which he lives. To Shakespeare sugar was a rare delicacy. It is of honeyed words and honeyed smiles that he speaks. Jamaica and Demerara provided for the quiet movement of the eighteenth century. The manufacture of beet sugar on a large scale was perhaps necessary before life could accelerate. How invariably in some children travel, change, rush, excitement, and so forth may produce a characteristic bout of vomiting, of asthma, of enuresis, of insomnia, or of night terrors—disturbances in all of which some degree of hypoglycæmia may act on a predisposing cause. All of us, under a sufficient emotional strain, grow pale and lax, yawn, feel nauseated, become irritable and sleepless, and lose control, concentration, and the ability to face the difficulties of life. The British Army found the value of rum. The German troops had their pockets full of sugar. It is the same with the warfare of the nursery. The negativistic, difficult child, ex-

hausted by his struggles with his parents, or by some emotional shock, has a high need for sugar. In practice night terrors are very often well controlled by glucose.

HYSTERIA AND ENURESIS

I wish I could speak as confidently of the control of enuresis. But here, and especially with older children the psychological factors concerned are more complex. In some few inveterate cases I think a true hysterical paresis of the sphincter has developed and perpetuates the incontinence. In a certain proportion of cases of enuresis, usually in boys, there is added incontinence of fæces. This form of fæcal incontinence is not to be confused with the accidental discharge of a watery stool which the nervous, excited child is unable to hold. In the incontinence of fæces of which I speak, and which accompanies certain inveterate cases of enuresis, the escaped mass is hard and scybalous. The symptomatology is indeed identical with that which is found in organic paralysis of the rectum from a transverse lesion of the cord. Very slowly the hard scybalous mass protrudes and escapes through a sphincter which is toneless and paretic. The child is quite unconscious of this passage. The mucous membrane, normally so sensitive, is completely anæsthetic. The child may not even feel a finger passed through the patulous sphincter in making a rectal examination. In practice it is not easy to demonstrate a similar paresis and anæsthesia in the sphincter of the bladder; but I think that this occasional extension to the rectum, where matters are more easily investigated, does very strongly suggest the hysterical nature of some inveterate cases of enuresis.

The child is physiologically hysterical and normally open to the force of all suggestions habitually made by the grown-up people around him. The hysteria of warfare differs from the hysteria of the nursery only because the nature of the suggestions offered. Hysterical blindness, deafness, mutism, and paralysis are rare in childhood, because these are not the disasters feared by a too anxious or apprehensive mother. The mother of the child with enuresis is often most miserable and most pessimistic. Everything has been tried. Nothing succeeds. I have known mothers who could hardly speak of the difficulty without tears. I have a letter from the child of one such mother:

"Dear Doctor," she writes, "I am now quite a dry girl. What cured me was sleeping with Daddy."

Up against this large unconcerned male she had regained peace of mind and self-confidence.

BIBLIOGRAPHY

1. SALOMONSEN, *Acta Pædiatrica*, 1929, 9 (Sup. 1).
2. HILLIGER, *Jahrb. f. Kinderheilk.*, 1914, **80**: 1.
3. HECKER, *Ergebnisse d. Inn. Med. u. Kinderheilk.*, 1911, **7**: 242.
4. FRÖLICH, *Norsk Mag. f. Laeger*, 1916, 519.
5. ROSS AND JOSEPHS, *Am. J. Dis. Child.*, 1924, **28**: 447.
6. CAMMIDGE, *Brit. M. J.*, 1930, **1**: 818.
7. OSMAN AND CLOSE, *Arch. Dis. Child.*, 1930, **5**: 149.

SURGICAL TREATMENT OF ANGINA PECTORIS.—D. Danielopolu records 28 cases of angina pectoris in patients aged from 24 to 64 who had been treated in different countries (Rumania, America, France, Italy, Austria, and Spain) by suppression of the pressor reflex. The operation consists in extirpation of the cervical sympathetic, leaving the stellate ganglion intact; this is associated with section of all the vertical branches of the vagus, the rami communicantes connecting the inferior cervical and first thoracic ganglion with the sixth, seventh, and eighth cervical, and first dorsal nerves, the vertebral nerve, and the nerves forming the anastomosis between the superior laryngeal nerve and the vagus. These nerves do not contain any fibres, the section of which is dangerous, but they carry a sufficient number of centripetal cardio-aortic fibres which require section to prevent anginal attacks. In his previous publications Danielopolu had suggested that the operation should be carried out in two sittings, but as the result of his subsequent experience he recommends that the whole operation should be completed at once. In the great majority of cases the operation was completely or almost completely successful. The patients in whom the results were not so good were those in whom it was impossible to perform the complete operation. The absence of any fatalities is attributed to the fact that care was taken to avoid cutting important nerves such as the inferior cardiac nerve, the stellate ganglion, and the rami communicantes connecting this ganglion with the second, third, and fourth dorsal nerves.—*Zeit. f. klin. Med.*, Bd. 113, 2 Heft, p. 294).

PHRENECTOMY

BY P. S. IRWIN, M.D.,
Kula Sanitarium,
Waiakoa, Hawaii

THE expression, "immobilization of the part", is a platitude; so common has its use become in speaking of the treatment of tuberculosis. But this familiar procedure is being utilized more and more extensively, and is the underlying principle in the splendid results obtained in recent years by various forms of thoracic surgery. In the treatment of tuberculosis and certain other chronic diseases of the lung, diminished movement, diminished volume and circulation result at first in lessened lymphatic absorption and toxicity, and later in healing. Unfortunately the various life-saving operations for collapsing the lung are limited by a small group of fairly sharply defined indications. Hence it is that any other procedure which will add to our range of usefulness is always eagerly received.

Of late years another device has come to be extensively used, and it is the purpose of this article; first, to emphasize that usefulness by outlining the indications; secondly, to present a reasonably safe operative technique; and, finally, to caution against its abuse by defining certain of its limitations.

INDICATIONS

Phrenic exeiresis, phrenicectomy, or simple phrenectomy, as it has come to be called, can claim fairly wide application in the therapy of tuberculosis, but it is recognized that the following indications must be applied with elasticity, for although many chronically ill patients have the identical specific lesion no two have the same combination of allied conditions. Therefore it is, in the last analysis, the patient himself who must be considered before applying any surgical measure. The general rules which follow can, however, be applied with a fair degree of accuracy.

The hemithorax is enlarged by two movements, that of the ribs and that of the diaphragm. The first of these, the well known "bucket-handle motion" of the ribs, is obviously more marked at the base, and it has been thought by some, on this account, to expand the lungs more in this region. The "plunger" action of the diaphragm, it has been argued recently, expands all parts of the lung equally, and therefore it has been thought that paralysis of the diaphragm would result in greater *relative* immobilization of the apex than paralysis of the rib action would produce.

A belief has grown out of this idea that phrenectomy is more beneficial in quieting apical lesions than the lower lying ones, since the latter are constantly being affected by the motion of the lower ribs. To this we cannot agree, since if "plunger" action is to be applied to diaphragmatic movement it would seem only reasonable to apply that term to rib action also, inasmuch as the plunger would act as well if applied in one direction as another. Certainly in our series the very mild effect on apical lesions was in marked contrast to the beneficial results obtained in those of a lower distribution. Just how much pleural adhesions changed this theoretical help into a practical impotence is a factor very difficult of determination.

Undoubtedly, compression of the lung at any point exerts a mildly selective compression on any distant contracting parenchymal lesion, since this contraction always takes place at the expense of the non-diseased, more expansile part. This selective action however, is greatly modified by several factors. If the lesion is advanced and entirely limited to the apex it may show a marked selective contraction, provided it is of the productive type without pleural adhesions. In a few fortunate cases of this kind very extensive disease of the apex with cavitation will show marked compression and healing, with no compression of the intervening healthy lung, but, unfortunately, very dense adhesions almost invariably accompany extensive disease in the upper lung. This will result in the lesion being held open, while the compression induced by the

rising diaphragm takes place in the undiseased portion alone where it will do no good.

INDICATIONS

Practically, then, phrenectomy is commonly productive of most good in the case of low-lying lesions, but some very gratifying results have been seen in strictly apical disease. The ideal indication has come to be early tuberculosis limited to the base. This type of lesion, dangerous because it can become fulminating so rapidly, has been satisfactorily controlled in our series by phrenectomy alone, which showed a marked selective action.

Cavities close to the base, provided they lie close to the median plane, are not benefited greatly by the operation, since elevation of the diaphragm cannot be so great over the tendinous attachment as over its muscular dome, nor can compression act satisfactorily through the rigidity of the lower bronchial branches.

O'Brien[1] has reported beneficial results in extensive active exudative lesions, where pneumothorax was inadvisable or impossible.

Certain old fibrosing fan-shaped lesions, with slight contralateral activity, too extensive to permit the possibility of pneumothorax, often present a painfully slow problem in which the natural "closing fan" can be greatly hastened, without danger, by a phrenectomy on the more affected side.

Any diffuse unilateral tuberculosis in which pneumothorax or other surgical measures are indicated, but for some reason are not applicable, is amenable to benefit by phrenectomy.

Everyone inducing pneumothorax on an extensive scale has seen a large cavity held out in an attenuated shape by adhesions to the chest wall, although it has been seen to grow smaller and smaller until hope is entertained of its complete obliteration. More often than not, however, the cavity assumes a stationary position, held open by this non-elastic fibrous band. If there is, in addition, an adhesion to the diaphragm, release of that tension by phrenectomy will often be sufficient to allow complete closing of the cavity. It is the writer's opinion that most cases of induced pneumothorax with adhesions to the diaphragm are materially hastened and permanently benefited by phrenectomy.

Hielborn has reported the successful induction of a pneumothorax on one side, and, on being later prevented from performing an induction for a lesser lesion on the contralateral side has successfully performed a phrenectomy there. He denies the danger of a contralateral exacerbation.

Phrenectomy is, in most cases, indicated at the termination of a complete pneumothorax that has continued for a long time (1 to 3 years), in order to prevent too great or too painful a re-expansion.[1] It is always performed as a therapeutic test of the contralateral lung, and as an aid to collapse before thoracoplasty, as Archibald, in his classical writing on that subject, has pointed out.

Frequently one is confronted with old fibrosing disease, where the great scar contraction has drawn both the chest wall and the mediastinum in towards the lesion. It is, however, still active, because the heroic efforts at self-healing by the contraction of productive tissue have reached the last limits afforded by the semi-rigid structures of the hemithorax. Here a phrenectomy, by aiding the natural retraction, will often produce most startling results, in as much as it may give just that small extra impetus necessary for complete healing. Davies[2] has reported six cases of functional cardiac disturbance with dyspnœa, due to displacement of the heart by scar tissue retraction, which improved after the heart had been released from its unnatural position by phrenectomy.

Bronchogenic cases of asthma accompanying the chronic fibrous type of pulmonary lesion, if they are due to unilateral disease and show retraction, are often surprisingly relieved by phrenectomy. Occasionally a dry irritating cough, unaccompanied by marked signs of disease, has persisted in spite of all treatment, and has been relieved by phrenectomy or phrenic nerve crushing.[3]

Many persistent empyema cavities of the non-specific type come eventually to the radical extreme of thoracoplasty, but, if they are favourably placed, phrenectomy alone may sometimes be sufficient to cause their complete obliteration. The operation has definite curative powers in the non-tuberculous cavitation of pulmonary abscess, where pneumothorax cannot be applied.

Everyone dreads a long drawn-out attack of unresolved pneumonia in the lower portion of

either lung, because of the well-known and serious sequel of bronchiectasis so prone to follow it. If resolution is delayed over a three months' period, phrenectomy should be done as a prophylactic measure against bronchiectatic cavitation. There is wide divergence of opinion concerning its usefulness in the treatment of bronchiectasis. Many complete failures have been reported, but the few brilliant cures resulting from the operation make it necessary to list it here.

Bilateral exeiresis has been used by some workers for a variety of conditions. Bilateral evulsion of the nerve does not ordinarily disturb respiration to any marked degree in man, even where there are no extensive adhesions. But speaking without experience in this particular field, the writer would suggest great caution and very serious consideration before paralyzing both sides of the diaphragm in the presence of a chest that is markedly raised and fixed in inspiration, resulting as it does in the patient depending largely on diaphragmatic breathing for his existence. If the operation is finally decided to be necessary in this type of case, injection of the respective nerves with alcohol, or preliminary phrenic nerve crushing, at different sittings, would seem to be the safer approach to the problem.

The foregoing constitute a fairly definite set of indications for the operation, but there are other circumstances in which it has a wider range of usefulness than is generally taken advantage of. But here again its application depends on the judgment of an experienced internist who is acquainted with the patient's reactive powers, etc. Here there is bilateral disease, with an extensive lesion on one side, and only moderate disease on the less affected. When the cases are conservatively chosen, operation can be a life-saving instrument, since the danger of a contralateral exacerbation, as has been shown by many, is minimal when compared to the effect of pneumothorax or thoracoplasty under the same circumstances.

It is not at all uncommon to see a slow and tedious recovery take place, under conservative methods, from an extensive lesion largely unilateral. If the patient is in the fortunate position where he can afford to keep his subsequent activities much below normal, he has a reasonable expectation of maintaining a fair degree of health indefinitely. But if he is a labourer he is driven back by circumstances to hard physical work more often than we like to admit in these days of organized social service. Most hospitalized patients learn to keep their physical efforts down to a minimum, but we would not be facing facts squarely if we ignored the type of mentality that can bring no intelligent effort to bear on this problem after discharge from personal supervision. Here the expectation of a recrudescence is all too often realized, and with a certain type it is almost certain. One has only to see a patient, who formerly had an extensive involvement, working safely under the protection of a paralyzed diaphragm which restrains his respiratory efforts on that side, within health retaining limits, to fully appreciate this great boon to so many of his type. As a prophylactic measure against recurrence of disease in a formerly badly damaged lung, phrenectomy, in properly selected cases, is without an equal.

CONTRAINDICATIONS

The writer would not like to give the impression that he undervalues pneumothorax or the other forms of induced pulmonary collapse. Where they are indicated, application is imperative. Phrenectomy has not replaced, nor will it ever replace, pneumothorax, since in comparison to the latter operation it is of only minor importance, but it has a definite indication where air-insufflation is contraindicated or impossible, and, therefore, a distinct place of its own. In our experience, exclusively apical lesions do not appear to receive as marked benefit as reported by some. If the operation is performed in the presence of active extensive bilateral disease it can be productive, at the very best, of only temporary improvement, which is no justification for operating, and can only cause a useful procedure to fall into disrepute.

It is almost universally discredited as a curative measure in bronchiectasis, even of a basal distribution, but, as previously mentioned, the occasional brilliant results reported by Davies,[2] Dumarest and Brette,[4] and others make further experience necessary before its usefulness here can be definitely decided on. Predominately exudative lesions, rapidly progressive, need pneumothorax, if unilateral. If this is not ap-

plied, phrenectomy will be of little or no use. It should never be used where only a temporary improvement is all that can be expected, as the suffering of any operation, even although its dangers are slight, is seldom justifiable under the circumstances, and there is a double contra-indication here, where, because of its obvious failure in some, it causes a refusal on the part of others to whom the operation would be of lasting benefit.

RESULTS

Evulsion of the phrenic nerve results in a paralysis and atrophy of the hemidiaphragm, which is forced and drawn up into the thorax, with a consequent diminution of from one-quarter to one-third of the volume of the chest on that side. The diaphragm rises on the average about 4 to 8 cm. on the right and from 2 to 6 cm. on the left, depending on several factors, such as the integrity of the contractile tissue of the lung, on pleural adhesions, on atrophy of the diaphragmatic muscle, and to a certain extent on intra-abdominal pressure. This rise often continues slowly for one year before reaching its maximum. During quiet breathing the hemidiaphragm remains motionless, but on forced breathing it exhibits the characteristic paradoxical movement of Kienboech, that is, it rises during forced inspiration and descends during expiration.

SURGICAL ANATOMY

The operation cannot be without serious danger if mismanaged, and it is for this reason not the simple one that it is frequently said to be. The following anatomical facts are noted, since they have a definite bearing on the technique and results of the operation and on certain complications.

The phrenic nerve contains both sensory and motor fibres. It arises principally from the 4th cervical, but receives branches from the 3rd and 5th, as well as from the sympathetic. It descends to the root of the neck overlaid by the sterno-mastoid muscle, where it runs downwards over the scalenus anterior, whence it passes beneath the inferior belly of the omohyoid muscle, thus having another fixed landmark. It then lies in close association with the thyroid axis, and passes between the subclavian artery and vein into the thorax. At this point, on the left side, it is crossed by the thoracic duct. On first entering the thorax it may be joined by the accessory phrenic. Its subsequent course in the thorax is irrelevant to the present subject, beyond the fact that it descends in intimate association with the root of the lung, pericardium and mediastinal pleura until it reaches the diaphragm, where it divides, pierces that muscle and supplies its under surface. In the thorax it is accompanied by the pericardiacophrenic artery and vein.

The point where it passes obliquely over the scalenus anterior is the one most easy of access, and in this region, all lying within about a finger's breadth, are the following important structures. Superficially and posteriorly to it lies the external jugular vein, while parallel and internal to its course is the ascending cervical artery and more internal is the internal jugular vein accompanied by the vagus. Just inferiorly and directly superficially to it run the superficial cervical and transverse scapular arteries. At the posterior border of the scalenus anterior, where the nerve crosses, lie the trunks of the brachial plexus. In the supraclavicular fossa is the middle cervical aponeurosis under which lies areolar tissue and lymph nodes, which may also bear an important relation to the nerve during its avulsion.

ANOMALIES

The diaphragm arises from embryological cervical tissue and migrates down to its position, carrying the phrenic nerve with it. This probably is responsible for some of the anomalies found in the relations of the nerve. Certainly they are many and can be very confusing. The nerve may be double or even triple. Alexander has reported as many as five. It may lie in front of, or behind, the scalenus, or it may lie embedded in the muscle. Matson and Plenk reported both a unilateral and a bilateral absence of a typical nerve. It may digitate to embrace various structures in the neck, notably the superficial cervical artery and subclavian vein. Sauerbruch estimates the accessory phrenic to be present in 30 per cent of cases; Goetz, in 80 per cent.

TECHNIQUE

Since the operation is followed almost immediately, in the presence of certain types of lesion, by a somewhat profuse expectoration, it is

considered safer to withhold pre-operative morphine, for fear of the cough reflex being diminished to the extent of causing a bronchogenic spread by contralateral splashing of infected sputum.

Preoperatively, amytal has proved very satisfactory, given in doses just sufficient to produce drowsiness and even sleep if the patient is not disturbed. Given intravenously at the rate of 1 c.c. per minute, care is taken to stop just at the point mentioned, 3 to 5 c.c. of a 10 per cent solution being the usual amount. This produces in all individuals an indifference to the unpleasant activities of the operating room, and in most an amnesia for all events of the operation, although they all cooperate to the extent of raising and turning the head. a procedure most useful in determining that important landmark the posterior border of the sternomastoid muscle. The cough reflex is always present after the operation.

Blocking of the cervical plexus with 10 to 20 c.c. of 2 per cent procaine has proved most useful, since the point of injection is well above the line of incision, and, therefore, in addition to giving perfect anæsthesia, it does not distort the field of operation. The point of infiltration is the middle point of the posterior border of the sternomastoid and the line of incision is half way between this point and the clavicular attachment of the muscle, beginning at its posterior border and extending backwards along the natural skin crease in the neck, roughly parallel to the clavicle.

With the patient flat on the back, the head being in the median plane and slightly extended by a small hard pillow just below the occiput, an incision, 3 to 4 cm. long, is made in the region just mentioned. This is ample for the exposure of the nerve in most cases, but if there is a fat short neck wider incisions are helpful and necessary. The platysma is divided and bleeding controlled. The external jugular vein which nearly always crosses the line of incision can usually be retracted. The sternomastoid muscle is then drawn forward, and the superficial layer of the deep cervical fascia next divided. The fat below this often contains lymph glands which may be tuberculous and give trouble if wounded, and, since the superficial cervical artery and veins pass directly below, operation at this point should always be done by blunt dissection with Mayo scissors. The scalenus anterior is then exposed. At this point in the operation, if the floor of the wound is carefully palpated, the finger will receive the sensation of being in a pocket which is formed by the scalenus below, the retracted sternomastoid anteriorly, and the central tendon of the omohyoid inferiorly. Very frequently the phrenic nerve itself can be felt at this point before it is seen lying on the muscle. The nerve is then exposed. At this point the internal jugular may be exposed anteriorly and medially, the brachial plexus is occasionally in sight in the posterior part of the wound, while the superficial cervical artery may be seen or felt in the inferior aspect.

After the nerve is carefully freed from the fascia it is picked up and gently squeezed. This stimulation to the phrenic nerve gives pain referred to the shoulder and if a further check is needed to make identification sure traction on the nerve will demonstrate its distal course, which is, unlike other nerves in this region, downwards and inwards. During this manipulation a careful check is made of the pulse, in order to insure against mistaking an aberrant vagus nerve for the phrenic. Having satisfied these requirements, inject the nerve trunk directly with procaine to anæsthetize the sensory fibres, and sever it. The distal end is picked up with Proctor's forceps and by steady traction the nerve is slowly rolled up on the instrument. After traction has been begun, a definite respiratory tug and often a cardiac tug (if on the left) can be felt which may be used as a still further identifying sign before the nerve is cut, if there is the slightest doubt of its identity. The nerve is carefully cleaned of all connective tissue as it is being withdrawn, thus avoiding the danger of clinging fibres being avulsed, tearing the phrenic artery along with them.

The exeiresis always gives some pain which at times can be very severe, depending on how intimately the nerve is bound down to the diaphragm and sensitive pleura by dense inflammatory adhesions. Ethylene is always at hand and is given immediately when the patient complains. As mentioned before, he may have amnesia for all these events but that does not, of course, justify inflicting pain with its concomitant shock. If anything less than 12 cm. of nerve are removed it is fairly certain that the accessory phrenic has not been avulsed. The skin is closed with a subcuticular suture, which in about one month's time gives a barely perceptible scar.

The technique outlined above is thought necessary to guard against various mistakes (some of them serious) which have been noted in the literature from time to time.

COMPLICATIONS

Cutaneous branches of the cervical plexus, which supply the shoulder and refer pain to that region, have been stimulated, and because of this subjective symptom have been mistaken for the phrenic nerve and evulsed. The vagus, long thoracic, sympathetic nerves and branches of the brachial plexus, have also, all in turn, been cut in mistake for the phrenic. Sauerbruch had a fatal hæmorrhage from the transverse scapular artery,[4] probably because an accessory branch of the nerve was wrapped around it. Hæmorrhage from rupture of the pericardiacophrenic vessels is not uncommon. Incredible though it may seem, the internal jugular vein has been compressed by retractors until it was emptied of blood and then severed in mistake for fascia. Unexplained hæmorrhages of the lungs have occurred following phrenectomy. The cervical glands, mentioned previously, have been wounded, with a resulting cervical adenitis, and even in one case a cold abscess.[5] The brachial plexus has been accidentally wounded; the thoracic duct has been torn; the dome of the pleura has been opened; the diaphragm has been torn. Various psychic disturbances have been reported following operation. The author has seen a serious collapse following the pain and shock of avulsion, where no gas analgesia was given.

This formidable array of what would appear to be avoidable blunders can be averted, it would seem, if the precautions previously outlined are observed.

SUMMARY

Phrenectomy is an extremely valuable aid in the treatment of lung diseases, and its advantages should be recognized and utilized to their full extent.

As in most cases of chest surgery, the operation should be performed only on advice from an internist who has had long experience in chest diseases.

The operation is by no means devoid of danger, and certainly should not be attempted indiscriminately by those unskilled in general surgery.

The indications are amenable to fairly definite application.

Phrenectomy has a selective action, compressing locally even apical lesions, but the extent of its selective effect depends on inconstant factors, such as the type of lesion and pleural adhesions.

As a prophylactic measure against recurrence of tuberculous disease of a certain type, in a labourer, it is of extreme value.

It is not to be considered as a substitute for the other methods of inducing pulmonary collapse, where they are indicated and can be applied.

The expectation of temporary improvement only is not considered as an indication for operation.

REFERENCES

1. O'BRIEN, *Am. Rev. Tubercul.*, 1929, **20:** 789.
2. DAVIES, *Tubercle*, February, 1928, **9:** 205.
3. BURRELL, Recent Advances of Pulmonary Tuberculosis, Macmillan Co., Toronto, 1930.
4. DUMAREST ET BRETTE, "Collapsothérapie Chirurgicale, Masson et Cie., Paris, 3rd edition, 1929, p. 370.
5. BERARD, GUILLEMINET AND DEJACQUES, *Rév. Belge de la Tub.* Mar. Apr. 1927.

ETHYL CHLORIDE AND ITS PLACE IN ANÆSTHESIA*

BY H. J. SHIELDS, M.B.,

Toronto

IT is not my purpose at this time to discuss the history of the use of ethyl chloride as a general anæsthetic, other than to state that there has been probably no anæsthetic about which so many divergent opinions have been expressed, both regarding its usefulness and clinical action as well as its mortality rate. Rather it is my aim to state personal views after a fairly extensive experience in its use clinically.

The average patient tolerates ethyl chloride very well; in fact one believes that in the average individual there is a wide margin of safety attending its use. When, however, this drug is employed more or less as a routine, as, for example, in the induction of ether, one finds that there are two distinct types of disturbance which may arise and these in two extremely opposite types of patient; these are the sensitive, robust, stimulated patient on the one hand, and the apathetic, asthenic one on the other.

Ethyl chloride is an anæsthetic lying between ether and chloroform. In its clinical action it bears definite resemblance to each, in spite of the fact that these anæsthetics themselves differ widely in their physiological action. Ether in certain patients has a tendency to produce muscular excitation; ethyl chloride also has this tendency in these same patients. The effect of chloroform in certain patients is one of cardiac depression, and so is that of ethyl chloride in the same patients. It is true that with this agent, in any one patient, both of these actions are at work, undoubtedly to a certain extent counteracting each other, and this probably accounts for the fact that ethyl chloride may be given to the majority of individuals without any untoward effects. It appears, then, that the deciding factor in the production of either a muscular excitation or a cardiac depression is to be found chiefly in the nature of the patient himself. In the stimulated muscular patient the sum total effect of ethyl chloride may be one of muscular stimulation, which, if extreme, may be serious; in the

* Read before the Section of Anæsthesia, Academy of Medicine, Toronto, February 28, 1930.

apathetic, asthenic patient the sum total effect may be cardiac depression, which also is sometimes serious.

Let us consider first the disturbances due to the ether-like action of ethyl chloride. Ether when given to the nervously stimulated, alcoholic, or athletic patient will frequently bring about a generalized muscular rigidity. Ethyl chloride under these conditions may do the same, but to a lesser extent, provided a free airway is maintained. When, however, it is administered in the presence of an airway obstructed from any cause whatever, generalized muscular rigidity, ranging up to an extreme opisthotonos, is likely to result. In other words, the degree of muscular spasm depends on the degree of airway obstruction rather than on any muscular excitant action of ethyl chloride, and I doubt very much whether this drug *per se* will produce any spasm other than some masseteric rigidity, which, as a matter of fact, is usually present, and, indeed, frequently makes difficult the maintenance of a free airway. This disturbance is commonly referred to as ethyl chloride spasm. It need never reach serious proportions, however, because when it is found impossible to prevent obstruction to the airway, a prompt withdrawal of the anæsthetic will usually prevent its occurrence. Even with a reasonably free airway, a commencing rigidity, noticed first usually in the neck, should be construed as the forerunner of further excitation, and here again the prompt withdrawal of the anæsthetic is clearly indicated.

This complication, even at its worst, is more alarming than dangerous, for an asphyxiated patient will usually relax before the heart action has entirely ceased, which permits of the institution of artificial respiration if this be necessary. There have been such fatalities reported, however, and one can readily conceive of a heart with a muscle unable to withstand the strain of severe asphyxia in the presence of a heart depressant such as ethyl chloride. In any event, ethyl chloride should be used with caution, if at all, in the athletic, the alcoholic, and the excessively nervous, all of whom are markedly stimulated in type and consequently prone to muscular excitation during induction with this anæsthetic. In addition, ethyl chloride should be considered as contra-indicated in any patient with obstruction in the respiratory tract, such as swelling in the throat, pressure on the trachea from any cause, or respiratory affections producing excessive bronchial secretions. The characteristic signs associated with its use in this stimulated group of patients are just what one would expect, *viz.*, pink colour, vigorous breathing, muscular rigidity, and an accelerated pulse.

The type of upset due to the chloroform-like action of ethyl chloride is more common and more serious. It is seldom met with in patients stimulated from any cause, while on the other hand it occurs with considerable frequency in the apathetic, asthenic types of individuals. The characteristic signs in these latter are the exact opposite of those obtaining in the former, *viz.*, pallor, shallow breathing, muscular relaxation, and a slow pulse. These patients become anæsthetized with small amounts of the drug. Their induction is particularly smooth and quiet. A good example of this type of patient is the man with a fairly well advanced carcinoma of the stomach. When brought to the operating room he is apathetic, evincing little or no interest in the preparations of the anæsthetist. He is undernourished, he has cold hands and feet, and a body temperature probably subnormal; his pulse rate is slow, perhaps no more than sixty. The first untoward sign in this type of patient is a further slowing of the already slow pulse, with a decided lessening of pulse volume. This result is likely to be brought about even with a most careful administration of the anæsthetic. With these signs there develops associated pallor and a lessening of the respiratory excursion and respiratory rate. There is marked muscular relaxation. Further administration of ethyl chloride in the presence of these untoward signs will very quickly bring about the sudden complete disappearance of the pulse. Cessation of breathing occurs at about the same time and is usually ushered in by two or three rapid and deep breaths. We now have a pallid, pulseless patient with widely dilated pupils and with half opened eye lids. Artificial respiration, if resorted to immediately, invariably very quickly revives him. If the mask has been removed prior to these last few respirations, as it will have been if the administrator is on his guard, resuscitation is still easier. As a matter of fact, if the mask is removed whenever the pulse rate falls below sixty, remedial measures are seldom necessary,

and this one believes to be the answer to this type of disturbance when it is encountered. It is better, of course, to use some non-depressant anæsthetic such as nitrous oxide in these apathetic types, with ether a second choice. It would seem wise also to consider a pulse rate of sixty or less as a contra-indication to the use of this agent.

This, then, is the chloroform-like action of ethyl chloride. There is, however, this difference that in cardiac disturbances with this drug the heart action, while slow, is regular, whereas with chloroform there is frequently fibrillation. This, probably, is the explanation of the fact that the ethyl chloride patient is the more readily resuscitated of the two, and one concludes that this drug is less toxic than chloroform, when both are exhibited in percentages just sufficient to produce anæsthesia. It shares with chloroform the disadvantage that untoward cardiac effects may be produced by a few breaths only of a too concentrated mixture. It must also be borne in mind that it possesses some properties not shared altogether by chloroform. It is, for example, extremely volatile and capable of rapidly producing third-stage anæsthesia. On account of its volatility one can step more readily from a safe to an unsafe dose, while in producing anæsthesia rapidly, in itself a good quality perhaps, the undesirable effects of ethyl chloride also must be rapid of development. For these reasons there is necessary even a more constant and more careful attention to detail with this drug than is the case with chloroform.

The slowing of the heart rate with ethyl chloride may be due to a cardiac inhibition of some nature, to a direct depressant action on heartmuscle, or to a sudden and marked fall in blood pressure from perhaps a vasomotor disturbance. In any case there is a fall in blood pressure, so that this slowing of the heart rate should be considered as a danger sign. I believe that it is always present as a premonitory sign in those patients who proceed in the manner just described to a point where resuscitation is necessary.

The average individual presenting for operation will lie between these opposite extremes of stimulation on the one hand and apathy on the other. In each of these extremes ethyl chloride should not be used. This average individual will usually exhibit enough stimulation from apprehension or perhaps fever to counteract the depressant action of ethyl chloride, without at the same time possessing sufficient excitation to develop untoward muscular phenomena. He will be a good subject for ethyl chloride, providing reasonable precautions in its administration are observed.

It is my feeling also that this depressant action of ethyl chloride is more commonly met with when this anæsthetic is used for the induction of ether anæsthesia than when used alone. In the latter case there may be some slowing of the pulse for a moment or two, but if the anæsthetic is given cautiously the patient frequently seems to settle down and may give no further trouble. In the former case the ether is an added factor. An ethyl chloride induction is usually smooth, because the effect of this agent is prolonged for a sufficient length of time to enable one to produce easily and quickly third-stage ether anæsthesia. In other words, one can crowd into the system in a short time a very considerable quantity of ether, and it is significant in this connection that these untoward signs already described do not reach their climax until perhaps several minutes after the ethyl chloride has been discontinued. Ether has some reputation as a heart stimulant, but it is very doubtful if, when inhaled, it is in any sense a stimulant to the circulation. When crowded rapidly into the system it is undoubtedly a depressant and this would seem to to be an explanation of the trouble arising in certain patients from an ethyl chloride-ether sequence.

There is one other occasion when ethyl chloride should be avoided and that is when the surgical procedure is likely to produce extreme pain. A good example is the manipulation of a painful joint. The pain from such trauma seems to penetrate the deepest anæsthesia that one can safely maintain with this drug, and on these occasions a dramatically sudden cessation of respiration and heart action may be brought about. These cases are particularly difficult of resuscitation from these syncopal attacks when any cardiac depressant drug has been employed.

Regarding the method of administration of ethyl chloride, it is safer when given on an open mask than in a closed inhaler in which

high percentages may be and undoubtedly are exhibited to the patient. It is also best given in low concentration at the outset, such as is obtained by the drop method, and increased gradually up to percentages necessary to produce anæsthesia. Also there will be, certainly, few fatalities when there is practised an immediate withdrawal of this anæsthetic at the onset of signs of impairment of the airway which cannot be remedied, or of a pulse rate less than sixty.

To summarize, I would emphasize that ethyl chloride is not a suitable anæsthetic for the excessively stimulated or the extremely apathetic patient; that it should not be used in the presence of respiratory obstruction of any character; that it is contra-indicated for very painful surgical procedures; that its real danger is partly due to its toxicity, but more particularly to its extreme volatility, which readily permits of overdose and to its quick action which necessitates constant and close attention for untoward signs; and, finally that for the average individual when given with reasonable precautions, it may be considered a safe anæsthetic.

THE PLACE OF ETHYL CHLORIDE IN ANÆSTHESIA

One can say without much fear of contradiction that ethyl chloride possesses qualities which have won for it a definite place in anæsthesia. The extent of its usefulness in any community depends upon conditions in that community. For instance, in a hospital equipped with modern gas apparatus there can be few real indications for ethyl chloride because nitrous oxide possesses most of the good qualities of this anæsthetic without being burdened with its bad qualities. In the hands of those familiar with its use nitrous oxide is undoubtedly safer, with but few exceptions, both for the induction of ether and for short operations. There are, however, some notable exceptions and these are found mostly in connection with operations on infants and very young children. These patients are not easily handled with nitrous oxide for several very good reasons. This is particularly the case when they are suffering from acute respiratory disease. Take for example the very young subject, say under two years, with an empyema requiring drainage. Such are not good risks with gas oxygen. They are best handled, of course, with a local anæsthetic, but where this is impracticable they may be dealt with under a very light ethyl chloride anæsthesia, as obtained on an open mask, with a reasonable assurance of safety and with probably fewer undesirable after effects than with any other general anæsthetic in common use. The same reasoning holds good for the use of ethyl chloride in the induction of ether in infants, and these may be induced with this drug more satisfactorily and with at least the same degree of safety as with nitrous oxide or chloroform. To repeat, nitrous oxide must be considered safer for induction purposes or short operations, with very few exceptions, assuming always that it is given by one familiar with its use.

In those localities where nitrous oxide is not available the situation is, however, decidedly different. What is to be done with the patient requiring just a whiff of anæsthetic? As a common example take the problem of a child or adult suffering from an influenzal type of cold with a cough and fever who develops an otitis media requiring drainage. Surely this is an indication for the use of ethyl chloride, of which a few breaths will suffice, and from which he will wake up in a minute or two with a minimum of after effects, rather than to subject him to the unpleasantness of ether with the risk also, of influencing unfavourably his chest disease, and with the probability of producing unpleasant after effects. There is also the problem in these localities of the induction of the ether anæsthesia with which the majority of operations will be done. Are the patients to be put to sleep with ethyl chloride, ether or chloroform? Probably the safest in average hands is ether. Induction with ether, however, is open to several real objections even when administered with the greatest skill. It has a disagreeable odour which lingers with the patient long after he has left the hospital. To produce even a bare unconsciousness without some sense of suffocation requires an average of about five minutes, during which time the patient experiences sensations of a decidedly unpleasant nature. Children frequently cry. They may have to be forcibly restrained, as may also sensitive adults. In addition, there is commonly excessive salivary secretion and marked muscular excitement, both of which conditions are unfavourable complications of anæsthesia. Chloroform, in addition to being open to most of these criticisms, carries with it immediate

dangers at least equally as great as those inherent in ethyl chloride. This latter drug, on the other hand, is free from most of these objections. It produces unconsciousness in a few seconds with as few subjective sensations as any anæsthetic we possess. It has no disagreeable odour, has small tendency to produce salivation, and in the average patient produces little or no excitement. It is open, however, to the one objection of being a little less safe in average hands than ether. In the absence of nitrous oxide is one warranted, then, in subjecting a patient to a slight extra risk to avoid the unpleasantness of ether? Before answering this question one must keep in mind the fact that it will be the lot of many people to require more than one visit to the operating room. This being so, one feels it to be a very worthy endeavour to avoid placing in the mind of the impressionable child or sensitive adult any fear which might throw a shadow over subsequent entries into anæsthesia. In any case, in these days of modern anæsthesia there should be little justification for permitting anything of an unpleasant nature to creep into our treatment of a patient, likely to be already bewildered by the thought of his surgical requirements. Ethyl chloride when reintroduced into the field of anæsthesia a few years ago, was seized upon as an agent qualified to produce anæsthesia without the unpleasant induction effects of ether or chloroform. It has held that position for many years, and, in my opinion, it would indeed be a backward step to return to the induction of anæsthesia by either of these drugs. After all, in experienced hands it has proved itself a safe anæsthetic; in average hands it is reasonably safe. Any one with a good knowledge of anæsthesia can soon master its technique and learn to avoid the pitfalls associated with its use.

Ethyl chloride is an anæsthetic with very definite limitations. When, however, its advantages over other anæsthetics may be made use of without at the same time experiencing its disadvantages it is a useful anæsthetic with a definite place in anæsthesia.

A REPORT ON THE FEASIBILITY OF A CONTRIBUTORY HEALTH INSURANCE SCHEME FOR MANITOBA

BY E. S. MOORHEAD, M.D.,

Chairman, Welfare Supervision Board Department of Health and Public Welfare

Winnipeg

IT is impossible to approach the subject of the application of health insurance to the Province of Manitoba until we have made a short survey of the trend of social economics and of the remedial legislation which has been brought into being during the last few decades to mitigate the disabilities of those who work for a daily wage. May I take you back to an early stage in English history, when you will find that much of the medical service was supplied by the monks, and hospital accommodation was provided in the monasteries. We still have terms in medicine which show this influence, such as Friar's Balsam, Jesuit Bark, from which quinine is obtained, and Monk's Hood, or aconite. St. Bartholomew's Hospital was founded in London by a monk in the year 1123. We then jump to the reign of King Henry the Eighth. The Crown seized the monasteries, ejected the monks, and organized medical service ceased to exist, so far as we know. After a long period, three events took place which were associated with the beginning of a new economic system in England, a system which was to draw the inhabitants from purely agricultural pursuits. These were, the developments of industry, the migration from country to town, and the erection and endowment of hospitals.

In the past, and until quite recently, the daily wage earners were included in the penniless group when sickness, accident or old age overtook them. They were entirely dependent on private or voluntary charity, and it was almost obligatory on the wealthy to leave some form of endowment to assist their less fortunate brethren. When the sufferings of the poor became greater than the relief supplied by voluntary organizations, it was recognized that some form of official recognition must be taken, and some relief given.

This was administered in a crude and unsympathetic manner by parish, municipal or county officials, who seemed to take pleasure in increasing the distress of the poor by pointing out the stigma attached to support at the expense of the taxpayer. Dickens, in several of his books, did much to force this point of view on the attention of England; and from that time, though the progress has been slow, a different outlook has arisen. During the last fifty years, it has come to be recognized that the man who has spent his life, or has become sick or injured, in the service of the industry of his country, is entitled to something more than a haphazard charity, or a grudging existence in a work or almshouse. When this view was accepted it was held that the State alone should be required to provide any comforts necessary, but by degrees it came to be acknowledged that such a scheme could not be carried on indefinitely, nor to the extremes which the socialist element demanded. It discouraged thrift and it cast an increasing burden on the taxpayer. Consequently, at a period when industrial output was diminishing and huge expenditures had to be met, the State decided that benefits must be paid for, in part, by the recipient of them. It is at this period that we find plans brought forward whereby benefits were secured by a form of insurance to which the insured, the employer and the State subscribed in varying proportions.

These were the steps which led by slow degrees to the present state of affairs in social economics. It must be remembered that there is a marked difference in the application of the regulations to the different subscribers, depending on the political outlook of the party in power. On one side, we have the condition in Russia where all contributions are made by the employer, as opposed to Roumania where the employee pays all the premiums. There remains that condition which we find in many of the newer countries, where the State or Province assumes the whole responsibility, and the employer and the employee make their contributions indirectly through general taxation.

It will be wise to make a brief study of those systems which have proved to be most popular in the older countries, with a view to fitting them into the economic system of the younger countries. Take the system where the employer, the employee and the State contribute certain fixed sums per week; this presupposes several premisses.

First, that a large percentage of the population can be placed in the relative positions of employer and employee. While this holds good in highly industrialized communities, it is not at all applicable to this country. Here we have the farmer, who for several months of the year may be quite independent, even to the extent of being an employer of labour; during the remainder he may be an employee working in a lumber camp or at some other winter occupation.

Secondly, that a week's, or a month's work will represent a definite sum which will be paid at regular periods and over a fixed number of months in the year. We have two difficulties here; (1) The farmer employer never knows until his crop is sold what his average weekly wage will be; and (2) in case of local or general disaster, the weekly wage may be non-existent. Accordingly, the employee of a farmer may fail to recover the wages which were promised to him, owing to such misfortunes as hail, drought, or an unsold crop; and further, while it has been possible in the past for actuarial departments to make an accurate estimate of the weeks of employment which may be expected by every working man, the world-wide wave of unemployment has upset all these calculations, countries are finding that the subscriptions of the employer and employee are much less than had been anticipated, and that the only form of adjustment which can be made, if the pledge made to the employee is to be kept, results in a larger share of the cost being shouldered by the State.

Thirdly, the success of an insurance scheme presupposes a reasonable fixity of residence, or similar forms of administration in the different parts of the Dominion. Both of these are markedly absent in Canada. A fairly large percentage of the labouring population is not fixed in its habitation, but travels to whatever district offers for the time being hopes of profitable employment. For instance we have the migration of harvesters from British Columbia and eastern Canada to the middle West, where the work is carried out by labourers over a period of six to twelve weeks, after which the migrants return to their own homes.

Finally, there is the lack of uniformity in the legislation in the different Provinces. There is not, and so far as one can see there is not likely to be, any similarity of regulations as they affect the various areas which compose the Dominion. If a man has acquired a status, and a Province an obligation, by the fact that during

a period of work the former has parted with a sum of money which is to be used for insuring him against disabilities, it is unreasonable that he should be penalized by moving to another Province, though still living in the same country and under the same flag. Yet that is exactly what would happen to him. To judge by the number of traffic laws, our legislators would appear to recognize that the world has taken to wheels, but they are apparently unaware of the fact that the wheels tend to reduce both time and space.

I think we all agree that it is reasonable that the man who is given medical assistance and relief to carry him over a period of illness should subscribe to it during the period when he is able to work. We then have to ask ourselves, should the plan be put into practice as a voluntary or a compulsory system? Many countries have tried the voluntary system and failed. One alone, Denmark, has succeeded. It is difficult for us living in the West to appreciate the density of the agricultural population, and equally difficult to estimate the wonderful spirit of cooperation found there. Denmark is surrounded by highly industrialized and thickly populated countries, where she finds a ready market for her produce; some years ago she was able to overcome her chief competitor, Ireland, in supplying eggs and butter to the English market. Denmark has something like 60 per cent of her population of three and a half millions insured against illness by the voluntary system, but Manitoba has no reason to suppose that she can follow this example.

Let us now consider the compulsory system, first, as applied to the employee, and secondly, as it concerns the individual, be he farmer, watch-maker, small store-keeper, or what-not, who earns a small livelihood, while maintaining his independence. The latter may be just as much in need of medical assistance and subsistence during illness as the employee. How are you going to collect from him? You certainly cannot do it through the mails. If he pays no attention to the notices that you send him weekly are you going to put a lien or mortgage on his property, or will you hale him into court? The courts would soon be clogged by the numbers appearing for judgment. Are you going to employ collectors or inspectors travelling over the immense distances which comprise the Province of Manitoba? The cost of collection would probably be 50 to 75 per cent of the money turned in, and no system of insurance could stand an overhead expense like that. In England, highly industrialized and thickly populated as it is, where only employees are accepted, and where those employees are frequently to be found to the number of thousands in one establishment, the cost of collection and administration is 12½ per cent. How much more would it be for us with our population which is mainly agricultural and certainly widespread? To set up a system which would only include Winnipeg and other cities and would be limited to employees is to approach the fringe of a difficult problem and leave the main question untouched. Summed up, as between a system of health insurance entirely supplied by the State and one mainly provided by employer and employee and subsidized against emergencies by the State, the latter is the better.

As between the compulsory and the voluntary system, the advantage lies with the latter. In each case it does not appear to be possible to devise a collecting machine which will be efficient, moderate in cost, and able to overcome the physical difficulties found in the Province of Manitoba. In leaving this phase of the question it seems appropriate to refer to the means which other countries have taken to solve difficulties due to physical causes. Three may be mentioned: the Highlands and Islands of Scotland; certain communities in the mountainous cantons of Switzerland; and South Africa. The National Health Insurance Act of Great Britain is operative legally over the whole of Scotland, but it is found that in certain sparsely populated districts where the inhabitants are poor and not engaged in any steady industry, it would not be feasible to collect the weekly dues, and, even if it were, no doctor could afford to work for the income provided, more especially when long distances and difficulties of transportation are taken into account. Therefore, the State induces doctors to settle in these areas by means of subsidies. The scale of fees to be charged by the doctor takes into consideration the poverty of the patient, but does not allow for the distance to be travelled. That is, the fee is based on the supposition that the doctor lives near to his patient. The State adds to the fees received a sufficient sum to bring the income to $2,500.00 per annum. Travelling allowance and house are also provided.

In some of the higher altitudes in Switzerland there are communities which are shut off from

other towns to such an extent that they would be unable, on account of snow, etc., to procure a doctor at certain times of the year, and unable to pay him for the time and distance covered. In such cases, younger doctors are induced to settle there for a time which is usually limited by the necessity of providing better education for growing children. The doctor is paid partly by a tax assessed on every member of the community and partly by a state subsidy. In the thinly populated districts of South Africa, instead of granting a direct subsidy the doctor's income from patients is increased by giving him official or state appointments such as health officer, sanitary inspector, coroner, etc., but the inducements to remain are not as a rule very great.

There are two difficulties which have developed in the working of the Acts to which I must draw your attention, for they may do a great deal to militate against success. I will state a provisional case. A farmer develops an attack of bronchitis in December; the doctor sees him and satisfies himself that he has the disease, advises him to stay indoors, and gives him some cough medicine. At the end of the week the doctor is asked to send some more medicine, and the attack may easily be made to last six or eight weeks. It would come to an end promptly if the patient found some profitable occupation. Seeing, however, that he has no work to do, that he might as well be drawing sick pay, and that he always has a bit of winter cough, you can see his point of view. You cannot say that it is fraudulent, but you can appreciate how much it will add to the cost. The same condition may arise in any case where there is seasonal unemployment, or where, owing to economic conditions, a large number are out of work. The man who loafs at home, with nothing to do and no prospect of getting work, develops digestive troubles and various neuroses which he considers entitle him to sick benefits. It is just this state of affairs which has caused a tremendous increase, about 100 per cent during the last ten years, in the number of people who are receiving medical services and sick benefits in England. It is a condition for which we have to be prepared if we undertake a provincial health insurance scheme similar to those in Europe. In my public ward service in the General Hospital there are numbers of adult men who on one plea or another endeavour to remain as bed patients during the worst months of the winter, but suddenly get rid of all their complaints as soon as milder weather brings a promise of employment.

Then there is the bottle habit, which also shows an alarming increase, and the custom of visiting the doctor for the weekly certificate and another bottle adds heavily to the cost. There seem to be two reasons for this. A bottle of medicine in the kitchen or bedroom is an outward and visible proof of an illness which might otherwise be questioned. Secondly, there is the feeling that one is getting something tangible in return for the money that has been paid. Some countries try to discourage the habit by requiring the patient to pay a definite percentage of the value of all medicines, etc., supplied to him.

It would add to the success of any method of State Health Insurance which might be introduced that it should be applicable to the whole Province, in other words, that it should fit both the industrial worker and the farmer. Such a project would at once introduce a difficulty which at present seems insuperable. The industrial worker's outlook is based on a pay-day which occurs every week or every fortnight. He bases his budget on an expenditure which has to be met and settled at regular intervals. His grocer, his butcher, etc., sell him goods on the understanding that he will not require credit for longer than two weeks. He frequently buys his winter supply of fuel by payments which are spread over the whole year. If he indulges in something expensive, or a luxury, such as a car or a gramophone, he takes possession on condition that he will make regular monthly payments. His pay is therefore definitely assigned in advance for either necessities or luxuries, with little or no leeway for any misfortune. To such a man, sickness of more than ten days' duration is a disaster. His credit which was good so long as he was working, at once ceases. He may lose possession of his car, etc., but, of much more importance, he and his family are lacking in the necessities of life. For this man, sick benefits must be combined with medical services. As opposed to this, there is the farmer who might be said to have one big pay-day per annum. There will, of course, be smaller sums from time to time when he sells milk, eggs and butter, stock, etc., from the farm. He is supposed to clear up his obligations every fall, lay in whatever will be necessary during the winter, and arrange for his credit during the year. For this man sickness does not mean ejection for non-payment of his rent; he has probably food and fodder sufficient

for his family and stock for some time; in many districts, he will have a good supply of fuel laid in for little more than the labour of getting it. The renewal of his clothing may have to be postponed. This man, when ill, is not nearly as much in need of sick benefits as the industrial worker in the city. I do not say that sick benefits to the farmer would not be convenient, and helpful, but he has not the same urgent need for regular payments as has the industrial worker.

Having discussed the question from the point of view of the sick man, we must now turn to the outlook of the doctor, the druggist and the hospital. I am supposing that competent actuaries would deal with the amount of sickness that would ordinarily arise in the Province, and that from this the amount of money necessary to provide the various services would be found. The hospital would certainly have to be reimbursed in case of a deficit, since no hospital could be allowed to close its doors for lack of funds. Doctors could be expected to undertake treatment on a whole time, or part time, basis, or on something like the panel system in England. The whole time doctor, appointed by the State, drawing a fixed salary, entitled to a pension, as a civil servant subject only to dismissal for gross causes, while a success in institutions, is looked at askance by the civil community to whose houses he may be summoned for sickness. The liberty of personal choice has been destroyed; there seems to the patients to be a lack of sympathy in their misfortunes, and a lack of understanding of their difficulties. In place of a family friend and physician they find a policeman who quarantines them for infectious disease, and an autocrat who announces that the sickness is over and that no more visits will be paid and no more benefits received. Requests for medical services at inconvenient times, or where no real illness exists, leave a feeling of irritation on both sides which is not beneficial to the smooth working of the plan. A physician, especially one who has been in practice for himself, rather resents the interference of the State. There are unnecessary forms and reports to be made out, medical inspectors visit him from time to time, causing annoyance, and a disgruntled patient may put him to a great deal of inconvenience by sending a report to headquarters. As against that, the security of tenure and salary, and the certainty of a pension, with a reasonable annual holiday do much to modify the various drawbacks. I do not think that this applies to the municipal doctor, but I shall deal with that point later.

The part-time doctor is little more than a makeshift. He is guaranteed certain gifts within the power of the State, accompanied by a certain salary, and he is expected to make the balance of his livelihood from the private patients whom he treats. This is not always satisfactory, because the income from private practice frequently turns out to be less than the estimate made by the State. In return for certain benefits the State requires him to look after poor people who cannot afford a fee; there is occasionally disagreement over the border-line cases. It is characteristic of this type of appointment that it always appears to be more attractive at the time of application than it subsequently turns out to be. From the point of view of the doctor, it has many drawbacks. He is not a civil servant; there is no security of tenure; he feels that if he works hard and makes a success of it, his subsidy may be reduced. Such practices are usually to be found in isolated districts where the amenities of social life are few, and the outlook for a wife and growing family disheartening.

National Health Insurance in England, with its panel system, is only suited to industrial areas or thickly populated rural areas. I may devote a few words to it. In a certain locality there are, let us say, fifty doctors. Thirty-five of them announce that they are willing to take patients under the panel system. That means that the names of these doctors are put on a list, board, or panel. Let us suppose that there are in this area 50,000 people who come under this system by right of the fact that deductions are made from their wages for medical services and sick benefits. Everyone of this 50,000 must sign up with one of the thirty-five doctors, provided the latter are willing to take them. There are certain conditions. No doctor can have more than, I think, 2,000 names on his list. There will be some patients whom nobody wants, but as the doctors have to give medical service to all the insured, these are usually divided amongst them. The doctors in most cases are paid on a per capita basis, and not on work done. Patients are allowed the privilege of changing their doctor, but with certain restrictions. The State lays down what service is to be given, which consists mainly of such attendance as can be provided by a general practitioner. He would not be required to do major operations, nor to attempt the duties of an eye and ear specialist, etc. There

are several advantages. First, and most important, there is free choice on the part of patient and doctor. If a doctor is open to taking panel patients, then he probably wishes to get as big a list as possible; therefore there will always be the stimulus of doing his best work, in order that he may acquire a reputation which will induce patients to leave another doctor and come on his list. Finally, it is to the doctor's benefit to use every endeavour to prevent illness, seeing that his pay per head per annum is fixed, and that it is less trouble to look after a well than a sick man. There are, of course, complaints. The patients want the service of specialists when their illness is such as to require expert assistance. The doctors feel that the bureaucratic hand of the State is too much in evidence; too many reports to be made; too many records to be filed; too much disciplinary action in case of large drug bills. On the whole, the system appears to work fairly well, and gives satisfaction to a large proportion of fifteen or sixteen million people. I mentioned in an earlier part of the report the fact that unemployment tended to increase the cost considerably. I should also have mentioned that the rural practitioner is allowed mileage. Even with this, as I pointed out, there are certain areas so sparsely populated that the panel system would not work.

There emerge then two great drawbacks to the panel system of health insurance, as applied to Manitoba; the impossibility of collecting the regular dues from people who are not in steady employment under a corporation or owner; and the impossibility of giving satisfactory service over large areas, where the population is too small to support a doctor by its contribution.

There has been tried out of recent years a new method, namely, the municipal doctor, which seems able to be adjusted satisfactorily to conditions in the country. It is not necessary for me to go into details. Roughly, it consists in the payment of a doctor for all services by means of a land tax. The spirit of cooperation which is so necessary for all these plans, is further evident in the project by which municipalities are combining to maintain a hospital, and pay a competent surgeon and staff.

A provincial contributory system of health insurance does not appear to be feasible at present in Manitoba; it might be applied to the cities; it would be too expensive for the average country district; and the unorganized territories, far from contributing for medical service, will probably have to be helped out for some time by means of a State subsidy.

THE SIGNIFICANCE OF REFLEX ACTION IN COLOUR VISION*

By Frank Allen, M.A.,

Professor of Physics, University of Manitoba

Winnipeg

WHEN the retina of the left eye has been stimulated by light of any pure spectral hue above a certain intensity, it is found that the sensitivity of the right is enhanced for three colour sensations, which are invariably red, green, and violet. The predominant enhancement always occurs for the sensation complementary to the stimulating colour. If the intensity of the stimulus falls below a certain critical intensity, which for white light is about 0.25 metre-candle, the effect upon the right eye is opposite in character, since it inhibits or depresses the sensitivity of all three colour sensations. When the stimulating colour of sufficient intensity is applied to the right eye, the measurements on that eye show that the one sensation, red, green, or violet, chiefly involved, if the stimulus is a simple colour, or the two if the colour is compound, as orange, yellow and blue, are depressed in sensitivity, while the complementary sensations are enhanced. These experiments, both contralateral and ipsilateral, may be readily explained by assuming the existence in the visual neural apparatus of a sensory reflex action which may exercise either a facilitating or an inhibiting influence on the retinal sensitivity by which its responsiveness becomes enhanced or depressed.

As the basis of the visual theory I am presenting

* A paper read on August 27, 1930, at the combined Annual Meeting of the British and Canadian Medical Associations, Winnipeg, Section of Ophthalmology.

is the existence of such a sensory reflex, it is desirable to establish it with the greatest possible amount of experimental evidence.

In the sense of hearing measurements have now been made in my laboratory by J. F. Allen which show that stimulation of one ear by a pure tone either enhances or depresses the sensitivity of the other in a manner similar to the contralateral effects in vision.

In the sense of taste, also, measurements show that stimulation of one side of the tongue by solutions of sugar, salt, acetic acid and sulphate of quinine, depress and enhance the four gustatory sensations, both ipsilaterally and contralaterally, precisely as in vision. It is found that weak solutions of these substances inhibit gustatory sensitivity just as feeble light inhibits retinal sensitivity; while in illustration of the facilitating process it is well known that distilled water stimulates the sweet taste after it has become enhanced in sensitivity by stimulation with an acid or a salt solution.

In addition to eliciting the sensations of taste, stimulation of the tongue by solutions evokes an enhanced activity of the parotid gland by which the amount of saliva secreted in a given time is much augmented. Inhibitory effects also occur. Measurements show that both ipsilateral and contralateral actions take place with appropriate stimulation.

In the muscles it has been found, by measuring the angle of elevation of the arm by post-contraction after stimulation has ceased, that stimulation of the left arm affects the right in the same way that stimulation of one eye or ear affects the other, or stimulation of one side of the tongue influences contralaterally the sensations of taste on the other side and the secretory activity of the opposite parotid gland.

In the sense of touch no contralateral experiments were thought of at the time the investigation was made. But it was shown that ipsilateral stimulation of the fingers of one hand enhanced the sensitivity of the index finger in the same manner that stimulation of one part of a retina influenced the sensitivity of an adjoining area, or of one part of the tongue influenced adjacent receptors.

In all these cases it was found possible to express the measurements in a mathematical law which states that some measure of the response is proportional to the logarithm of the intensity of stimulation. The formula is similar to Fechner's celebrated psychophysical law—

$$R = \kappa \log I + c$$

where R is the measurement of the sensation, I the intensity of stimulation, and k and c are constants.

The evidence cited has been set forth at length in numerous papers published by the writer and his students. It proves quite conclusively the identity of the actions in all the neural systems to which reference has been made. No exception will probably be taken to the explanation of the phenomena of secretion and muscular contraction by reflex action. It seems reasonable to conclude, therefore, that the identical behaviour of the sensory neural apparatus similarly results from reflex action of a sensory character by which the sensitivity of the receptor end-organs is controlled.

The theory of sensory action to which these investigations lead may thus be briefly stated. When a suitable stimulus is applied to receptor organs, the afferent nervous impulses excite characteristic sensations in the cortical centres, and in addition simultaneously evoke reflex impulses which are conducted to the receptors, causing either depression or enhancement of their sensitivity. The function of the sensory reflex actions is to control the sensitivity of the receptor end-organs. The alteration of sensitivity occurs in receptors for other sensation qualities within the area stimulated, and extends ipsilaterally to adjacent areas and contralaterally to corresponding areas on the other side of the body. Thus stimulation of an area of the right retina by red light, for example, causes a sensation of red, while the reflex or inductive reaction extends to the green and violet sensations within the area stimulated, and to all three sensations in surrounding areas of the stimulated retina and to the corresponding area of the left retina as well. The inductive action of dim light of all hues is depressing in character, while that of bright colours is enhancing.

After the retinal receptors, or, indeed, the receptors of any sense organ, have been stimulated they recover their normal sensitivity by a series of oscillation of the reflex actions in which inhibition and facilitation periodically alternate with each other. The retina is depressed or enhanced in sensitivity for further stimulation according to the time that has elapsed since the first stimulation ceased.

This theory of sensory action affords a simple physiological explanation of many phenomena of colour vision, only a few of which may now be considered.

It has been found, as remarked above, that when the retina is feebly stimulated with white or coloured light the three primary sensations are all depressed in sensitivity, so that their responsiveness is much lessened. Vision, therefore, becomes doubly difficult in dim illumination, first, because the light is weak and, secondly, because such light as there is lowers the retinal sensitivity. This behaviour of the eye is probably a factor of great importance in such ocular conditions as miners' nystagmus.

On the other hand, if during some pathological condition of the retina it is desirable to secure visual relief for the eye, it will often be found advantageous for the patient to remain in a dimly lighted rather than a completely dark room. A person suffering from detached retinas once wrote to me that the greatest relief experienced in years was obtained under such conditions.

It has been found that the shortest wave lengths of the spectrum, the extreme violet and blue, are as much as seven hundred times as powerful in exciting reflex action as the brightest yellow. This leads to the conclusion that violet, especially, functions chiefly as a retinal sensitizer. Artificial illuminants that are deficient in these rays are, therefore, devoid of an element most essential to visual efficiency. Probably this inductive power is also possessed by the longer ultra-violet rays, so that a moderate amount of this light, under certain conditions, may be beneficial to vision. Possibly the yellowish light of a miner's lamp suffers an additional disadvantage from the low intensity or absence of violet and ultra-violet radiation.

Probably the most difficult problem in colour vision has been the explanation of simultaneous contrast. It has been the rock on which most of the theories of colour vision have been wrecked. The far-fetched theories of Helmholtz and Hering have admittedly failed to solve the problem. The explanation by the reflex theory is simple, founded upon ample experimental evidence and equally adequate for both uniocular and binocular contrast. The general rule of contrast is that each contrasting colour appears modified as if mixed with nearly the complementary of the other. If, for example, contiguous green and yellow patches are viewed by one eye, the green light stimulates all three colour sensations, red, green, and violet, in the corresponding retinal area, but predominately the green. The inductive action of the yellow light enhances the sensitivity of all sensations in the green area, but predominantly the complementary violet sensation. The green light consequently will stimulate this sensation more than normally, with the result that the green colour appears bluish-green. In the yellow stimulated area the red and green sensations, whose equal excitation causes yellow, are stimulated more than the violet. The inductive action of green light, however, enhances predominantly the complementary red and violet, *i.e.*, purple, sensations of which red is visually the more conspicuous. The yellow light will now stimulate the red sensation a little more than the green and will consequently appear orange in hue. Thus both colours appear as if mixed with the complementary of each other. The same explanation applies to binocular contrast, for the reflex actions involved in the two cases are identical.

There are two well defined types of abnormal colour vision which are known as colour blindness and anomalous trichromatic vision. Of the former seven general classes are possible; three classes in which one of the three fundamental sensations, red, green or violet, is defective; three classes in which two of the sensations are defective; and one class, total colour blindness, in which all three sensations are defective.

According to the measurements of Abney, the white sensation is formed by equal stimulation of all three sensations. In colour blindness, therefore, no colour sensation can be entirely missing since the colour blind see white, while totally colour blind subjects see all colours as white or gray. This indicates that in achromatic vision every colour always stimulates all the primary sensations equally. Colour blindness, or defectiveness, seems to be due to the excessive development of the inhibitory reflex actions which may affect any one, any two, or all three primary sensations. The perceptual colour sensation pattern must consequently be modified to an extent depending on the degree and incidence of the inhibition. In anomalous vision the colour sensations are supersensitive. The cases known seem to be limited to the red and green sensations. The explanation seems to be found in the excessive development of the enhancing impulses.

According to this theory both types of abnormal vision, particularly colour defectiveness, could be remedied if the efferent nerves could be stimulated at their cortical origin.

In the bulk of humanity there seems to be

preserved a proper balance between the direct results of sensory stimulation and the reflex actions which are evoked by them. This condition is termed normal colour vision. Some four per cent of men have this balance disturbed by over-development of inhibition. They are accordingly selectively subsensitive in their defective colour sensations. Another proportion, equally great, have the normal balance disturbed in the opposite direction by over-development of the enhancing actions. Such persons, therefore, possess supersensitive colour sensations, or anomalous trichromatic vision.

Probably a similar grouping of people can be made in regard to every sense organ. The great majority are normal, and smaller groups are either subsensitive or supersensitive. Possibly this principle may be generalized to cover the intellectual powers and the emotional and volitional faculties as well. For in all these divisions the normal, the supernormal and the sub-normal groups are well recognized. Thus the principle at which we have arrived from experiments on vision may have in the broad field of psychology the widest application.

The reflex theory strongly supports the trichromatic theory of Young. The facilitating reflex actions by which the complementary sensations of the exciting colour are enhanced provide a physiological explanation of those phenomena for which Hering assumed a chemical assimilative process in the retina. In these essential particulars, therefore, the two rival theories become harmonized.

ON THE ADMINISTRATION OF CARMINATIVES

BY V. E. HENDERSON,

Department of Pharmacology, University of Toronto,

Toronto

THERE is no field where the taste of the patient must be more closely considered by the physician than when he wishes to give his patient the most palatable carminative. But what are carminatives? What do they do, and when are they indicated? These are rather wide questions, and the answers I propose will not be concurred in by all practitioners. Animal experimentation furnishes no clear information.

The carminatives are usually considered as including the volatile oils, Peppermint, Wintergreen, Anise, Dill and Cloves, the pungent principles in Cinnamon and Ginger, and Chloroform. There are others, but these will serve as examples. These are usually administered with alcohol, and alcohol itself often produces the carminative action. Their effect appears to be a sense of warmth in the lower œsophagus and in the stomach, doubtless due to a local rubefacient action, (*i.e.*, dilatation of the smaller blood vessels) and a relaxation of the cardiac sphincter. A characteristic effect is produced in the case of flatulency, when there is an oppression due to a gas bubble in the gastric fundus. Soon after taking, the gas is belched up. Certain patients who eat, perhaps unwisely, when tired have this sense of oppression. Here a pure carminative is indicated. Undoubtedly the alcohol usually given with the carminative proper aids in the effect. Such prescriptions as the following may be recommended:

℞	Spiritus Anisi	mm. ii
	Spiritus Chloroformi	ʒ iss
	Syrupi	ʒ i
	Elixir Aromatici ad	ʒ i
	Dose—2 dr.	
℞	Tr. Cinnamomi	ʒ iiss
	Spiritus Chloroformi	ʒ i
	Tr. Cardamomi Co.	ʒ iiss
	Syrupi ad	ʒ i
	Dose—2 dr.	
℞	Spiritus Anisi	mm. xv
	Spiritus Chloroformi	ʒ i
	Tr. Cardamomi Co. ad	ʒ i
	Dose—2 dr.	

The alcoholic content of the third of these prescriptions is somewhat greater than that of the other two. They have all been devised to meet the present situation in regard to alcoholic beverages.

In many cases it is found advantageous to combine such purely carminative mixtures with an alkali, and for this purpose sodium bicarbonate is usually employed, as in the following:

℞	Sodii Bicarbonatis	gr. xv
	Tr. Cardamomi Co.	ʒ ss
	Tr. Zingiberis	mm. ii
	Syrupi Zingiberis	ʒ i
	Aquæ ad	ʒ ss

Dose—4 dr.

The dose of bicarbonate, if it is to be completely dissolved, must be small, if the alcoholic carminative content is adequate, but as a rule such a small dose suffices. If it has to be made larger, then it must be present in suspension, and in this case magnesia, either the light or heavy, or calcium carbonate, may well be substituted for the sodium bicarbonate.

THE HISTORICAL BACKGROUND OF PHYSIO-THERAPY

BY THE PUBLICATION COMMITTEE OF THE CANADIAN RADIOLOGICAL SOCIETY

I.

THAT there is a definite cycle in the affairs of men is a fact that needs no further comment, for it is a matter of very commonplace observation with the members of the medical profession. To what extent cycles have influenced the whole field of medical endeavour it is quite impossible even to hazard a guess, but in the more limited field of therapy by physical agencies there can be no question of its influence.

As limited as is the field of physio-therapy, to do even scant justice to its historical background in a brief way it seems desirable to divide the field into subdivisions, and so for our purpose we shall consider the history from the viewpoint of light-therapy, hydro-therapy, and electro-therapy.

That physio-therapy is not a "mushroom" that has pushed itself into being overnight (a not uncommon viewpoint) is at once apparent when the subject is historically reviewed; that physio-therapy is not an unwanted child in the field of therapy is also readily appreciated when its present status is recognized. (The present status of physio-therapy will be considered in a succeeding article.)

Light-therapy came first into being when man made his primitive debut, for science has amply revealed that light, a constant factor of environment, not only protects us from disease but relieves many of our disease necessities.

When Aknaton, the first Pharaoh, 3,000 years ago, set up "Alton Ra," the Spirit of the Sun, as a God to be worshipped by the people, he recognized apparently in a very full measure the blessing mankind normally receives from the sunlight. This recognition apparently became shortly widespread, for throughout the early history of the Egyptians, Greeks and Romans, literature very frequently refers to the treatment of diseases by light, and in the writings of Hippocrates, Celsus and Galen, the application of these teachings is revealed. In Pliny's writings is recorded "Sol est medendorum maximum," an admission of the time that must carry conviction if we are inclined to question the fact of the very early advent of light-therapy.

To Newton, more than to any other, must go the credit for first preparing the way for placing the subject of light on a scientific footing, but to Finsen must ever be conceded first place in putting light on a sound, scientific basis from a medical viewpoint. Finsen's work in treating and curing lupus prepared the medical mind for intensive research, an effort that has not lessened to this day. Bernard's work in healing chronic infected wounds with light, and Rollier's and Sir Henry Gauvain's intensive work and extensive writings in more recent times in relation to tuberculosis and light-therapy, cannot but convince the most sceptical that the advent of light-therapy is one of the greatest advances that has ever been made in therapy.

Enthusiastic historians tell us that the oldest form of therapy is hydro-therapy, but it is possibly an open question as to whether it actually antedates light-therapy in antiquity. There is ample historical evidence, however, to convince one that from earliest times the Egyptians, Greeks, Romans, Persians and Assyrians have had a rather complete working knowledge of hydro-therapy and if we appeal to the writings of Hippocrates we shall readily see that his conceptions of hydro-therapy were advanced indeed. In early Sparta cold bathing was by law compulsory , and Pliny tells us that for five centuries Roman emperors vied with each other in building more and more elaborate baths where people might attend for treatment and health preservation purposes. Many a traveller to the Far East can testify with his life to the efficacy of hydro-therapy when smitten with fever when travelling through those areas.

To Priessnitz, of Silesia, a common peasant, must go the honour of popularizing hydro-

therapy in Europe; not only was his work recognized by the profession but he was granted a diploma by the Austrian government, and representatives from many European governments went to observe his work and report on his achievements. To Winternitz, of Vienna, however, belongs the honour of thoroughly studying hydro-therapy and establishing for all time this art on a scientific basis. Only those who have studied these principles and have followed the work as laid down by Winternitz are in a position to appreciate what hydro-therapy has accomplished. By scientific hydro-therapy alone the typhoid death rate was reduced in New York from 20 per cent to 6 per cent with the introduction of the Brandt bath.

At first thought it might appear that electro-therapy is a product of recent years, but static electricity was described by Thales of Miletus in 600 B.C., and in 79 A.D., Pliny prophetically writes that the paralyzing shock of the torpedo fish (that inhabits the Mediterranean) might be used in treating disease. In the reign of Queen Elizabeth Dr. Gilbert wrote extensively regarding magnetism, and a half century later the first primitive static machine was made in Germany. One century later Winkler, of Leipsic, introduced the first powerful static machine and, slightly later, the principle of the Leyden jar was discovered. Shortly after this time static machines appeared in England, and in "Primitive Physic," written by John Wesley in 1780, he describes many conditions successfully treated. From his writings it would appear that the profession was rather sceptical, for he makes a strong plea for them "not to condemn that which they know naught of, but to make a trial and then their own senses will tell them whether it is a plaything or the noblest medicine known in the world."

That happenings small in themselves may readily offset the advantage of much greater things is very well known. In 1753, Kratzenstein, the father of electro-therapy, was invited by the King of Denmark to investigate the relation of electricity to the treatment of disease. So impressed were those that came in contact with his work that shortly the word passed around that he was working magic, and in a very short time it was impossible for him to secure lodgings in Copenhagen. Again we see this, in the case of the Abbé Nollet, who was summoned by the King of France to demonstrate the wonders of electricity. In his enthusiasm to make a mighty showing he had a great company of good common folk join hands and they formed a circle that was 1,800 yards in circumference. When the current was turned on, with one and common accord they straightway leapt into the air, and with them went all chance of ever giving them thereafter therapy dosage of static electricity, "for truly this must be magic."

About this time Galvani made his early discoveries in the field of galvanism and thought he had discovered "the essence of life." Volta, however, pointed out the significance of his findings. The works of these two men had the effect of preparing the way for Vorsted's works at Copenhagen, who in 1820 laid the foundation work that Faraday seized upon and in 1830 made, as a result, the first Faradic coil. Shortly after this (1836), Dr. Golding Bird opened in Guy's Hospital, London, an electrical department.

Bird's work was conscientiously done and was extremely meritorious. For electrical workers it is interesting to note that in 1847 he addressed the Royal College of Physicians on physiology and therapeutics and presented electro-therapy as a "highly rational but fallible remedy." With considerable heat he noted that the patients referred to the department usually came with the instruction "let the patient be electrified" and no account was taken of the disease condition or mode of application, "and further the cases referred were absolutely hopeless from any other viewpoint." His work on copper ionization of chronic ulcers was well received and during his address he made reference to the fact that Thomas Spencer Wells (afterwards Sir Thomas) had used the principle in treating casualties of the Crimean War.

Duchenne, of Boulogne, another tireless worker, in 1830 addressed the French Academy of Science on physiology, pathology and treatment; on his monumental work the edifice of neuro-pathology has been built.

In 1898 D'Arsonval revealed to the world the principle of the high frequency machine and in 1907 Nagelschmidt, of Berlin, unfolded to the medical world the secret of its power in favourably influencing disease.

Thus in quick review are shown glimpses of the evolution of the art of treating disease by physical agencies. Cyclic indeed has been its turns. On many occasions has this art reached a pinnacle, to be dashed again apparently to abysmal depths. The mysticism that has so long sur-

rounded the field of electro-therapy and has touched so often the minds of men has been the very thing that has been seized upon by unscrupulous charlatans to the later temporary undoing of much that had previously been so long and painstakingly built upon. The most notorious forms of quackery have seized upon practically every noteworthy advance that has been made in the field and bad odour has been the net result.

Since the greatest primary advances have been made practically without exception by laymen, in contra-distinction to medical men, it is not hard to see how at times it was difficult for the profession to accept the new theories and teachings that were advanced since to them "they were veriest heresy, being empiric." It is equally easy to see how physio-therapy would have been saved much indignity had the profession the courage to "examine and see," as John Wesley had exhorted, or if they had been convinced at an earlier date by the leadership that was given by men of such type as Bird.

In daily service, since the dawn of light on the earth, physical agents have ever been active in promoting health, happiness and well-being, matters of supreme importance to the medical profession, yet it is only today that our teaching schools, generally, are beginning to establish Chairs of Bio-physics, in order that their graduates may be efficiently taught the relationship of physiology, pathology and physio-therapy. Born of the dark ages, empiricism has been the cloak that has inconsistently separated the profession from the recognition of this, one of the most rational of all therapeutic measures. No treatment devised by men has ever been other than empiric in its inception, and very much indeed of that which to-day is recognized as "good" in the profession is still "empiric," though extremely useful in relieving sickness and distress.

Truly, as Hippocrates wrote years ago: "Life is short, art is long, and judgment difficult."

Clinical Lectures

PLACENTA PRÆVIA—CÆSAREAN SECTION—RECOVERY

BY ROSS MITCHELL, M.D.,

Winnipeg

MRS. R. P., aged 35, was admitted to the Winnipeg General Hospital on June 18, 1927, on account of uterine bleeding. She was then about 7½ months pregnant, her last menstrual period having begun on October 25, 1926.

In addition to measles and mumps in childhood she had had typhoid fever at the age of 16. On June 30, 1926, she had a Todd-Gilliam suspension of the uterus, a suspension of the right ovary, and appendectomy done at the Winnipeg General Hospital. In October of the same year she had a radical operation for right inguinal hernia.

This woman's obstetrical history was not without incident. Her first child, a boy, was born in 1913, was delivered with forceps after 40 hours of labour. He weighed 9 pounds at birth. The second child, a girl, weighing 7 pounds, was born in 1915 after 2 days' labour. The third child was born dead in 1920, in rural Manitoba, after instrumental delivery. The mother says that she had placenta prævia in this labour. It was not possible to confirm this from the doctor in attendance on that occasion. In 1923 the fourth child, weighing 9 pounds, was delivered with forceps after a labour of 18 hours. In October, 1925, and March, 1926, she aborted at about four months. Following the latter abortion a curettage was performed. After the second pregnancy she developed a mild nephritis.

During this pregnancy she showed evidences of a mild toxæmia, headaches, some œdema, and a rise in blood pressure, which, however, responded to treatment of rest and a milk diet. She was admitted to the hospital on April 18th and was discharged April 26th. Her blood pressure which had risen to 135 (systolic) on April 18th dropped to 108 (systolic) on the 22nd. On April 20th her blood urea was 12.1 mgrm. per 100 c.c. blood and the creatinin 1.6 mgrm., well within normal limits. From May 12th to May 27th she was again a patient in the hospital. She complained of pain in the hips and lumbar region which made it almost impossible for her to turn over in bed, and also of severe frontal headaches. During this time her blood pressure did not rise beyond 122. A Mosenthal test, done on May 20th, showed total day urine of

935 c.c., with an average specific gravity of 1019, and a total night urine of 480 c.c., with a sp. gr. of 1017.

On February 27th she had a slight hæmorrhage, which lasted two or three days. In April she had another hæmorrhage, which lasted till April 6th or 7th. At 2.30 a.m., June 18th, she entered the hospital stating that pains had begun at 1 p.m., June 17th, and that bleeding came on shortly before admission. The pains were five minutes apart on admission, but by 3.05 a.m. they had ceased. The bleeding was sufficient to saturate one pad in half an hour with bright red blood. The abdomen was lax; the position R. O. A., the head floating high above the brim; the fetal heart tones were heard in the right lower quadrant of the abdomen. On rectal examination there was no dilatation of the cervix and the occiput could not be felt. The urine contained no albumin.

PROFESSOR: Here we have ante partum hæmorrhage in a patient 7½ months pregnant. The most probable cause is a separation of the placenta either in the normal position or in the lower segment. In support of the former view is the previous mild toxæmia; in support of the latter, the two previous painless hæmorrhages, the lack of albumin in the urine, and the high position of the head. The matter is so serious, however, that the diagnosis cannot rest on the balancing of probabilities, but must be made by digital examination of the lower uterine segment after the patient is so prepared that if the examination starts up increased bleeding the hæmorrhage can be arrested.

CLINICAL CLERK (continuing the history:) A vaginal examination showed a small cystocele and large rectocele. The cervix, which admitted three fingers, had a thick hard anterior lip and a thinner, softer posterior lip. The edge of the placenta could be felt just above the internal os posteriorly and to the right. The blood pressure was 122/82. There was no further bleeding but for several days there was a brownish discharge.

PROFESSOR: On account of the marginal site of the placenta, the fact that she was only 7½ months pregnant, and that she was in a hospital where aid could be furnished at once if bleeding were resumed, it was decided not to evacuate the uterus as soon as the diagnosis of placenta prævia was made, but to await developments.

CLINICAL CLERK continuing: At 4.30 p.m., July 9th, three weeks after admission, the membranes ruptured. The head was riding above the pelvic brim. A tight binder was applied. The position was diagnosed as L.O.A., with the fetal heart tones heard in the left lower quadrant of the abdomen. At 9.45 p.m. there was a slight show and half an hour later pains came every two minutes. At midnight, though pains were fairly strong, there was only slight dilatation and at 12.55 a.m. morphia gr. 1/6 with scopolamine gr. 1/200 was administered. She had some sleep and the pains returned at 9 a.m. but were weak and ineffective. At 1.30 p.m. a hot soap suds enema was given but the pains died off and she slept fairly well that night. At 8 a.m. July 11th there was a serous discharge with some blood. Pains did not recur. Later in the afternoon a consultation was held. On account of the history of previous difficult instrumental labours, the position of the placenta, and the fact that the membranes had ruptured over forty-eight hours previously and yet the head was not engaged, it was decided to do a Cæsarean section.

PROFESSOR: With the waters drained away version was out of the question. The fetal heart sounds were clearly heard and it was felt that a Cæsarean section would not only save the child but would improve the mother's chances by enabling the operator to deal directly with the placenta.

CLINICAL CLERK (continuing): Under gas anæsthesia a low Cæsarean section was done at 8 p.m. July 11th. The placenta lay on the right side of the lower uterine segment bordering on the os. After the uterine incision was sutured it was noticed that a loop of bowel lay between the uterus and the round ligament which had been brought up to the internal ring in the operation of June 30, 1926. The loop was pulled up and the space between the uterus and ligament was closed. The condition of mother and baby at the close of this operation was good.

On the following day the temperature was 99°2 ; the pulse, 100. This was the highest point in the temperature recorded. On account of the possibility of a dilated bladder interfering with the healing of the transversely divided reflection of the peritoneum from the bladder to the anterior surface of the uterus the patient was catheterized for the first three days following operation. A catheter specimen of urine taken on July 12th, the day following operation, showed marked albumin with a small amount of blood and a few pus cells.

PROFESSOR: This story, unlike some of our hospital experiences, had a happy ending. May

I call your attention to a few points which present themselves. One is the appearance of marked albumin in the urine the day after operation, though specimens taken on June 18th, June 28th and July 4th showed no albumin. In practically all cases the urine of women during labour shows the presence of albumin, probably on account of the severe muscular exertion. Another point is that this case is not recorded in order to present Cæsarean section as the ideal method of delivery in every case of placenta prævia. Each case of placenta prævia must be studied individually. In some instances simple rupture of the membranes will suffice; in others the introduction of a de Ribes or Voorhees bag controls the bleeding and stimulates dilatation of the cervix, while in still others a bipolar version, so that the child's thigh and hip act as a tampon to arrest hæmorrhage, is easy and effective. Indeed, so good an authority as Jellett, late Master of the Rotunda at Dublin, and Director of Obstetrical Services for New Zealand, strongly advocates this as the method of choice. The only requisite for bipolar version is that the cervix should be dilated sufficiently to admit two fingers, and in practically every case of placenta prævia, there is this amount of dilatation. If not, the cervix can be packed and within an hour or two there will be sufficient dilatation. No instruments are required for a Braxton Hicks version, and the results for the mother are, on the whole, very good. There is, however, a very heavy fetal mortality, probably at least 50 per cent. In some cases of delivery *per vaginam* the placenta does not separate readily and there is a tendency to post-partum hæmorrhage from the placental site in the non-contractile lower segment. These considerations make a Cæsarean section the method of choice when the operation can be done with reasonable safety for the mother and when the child is viable. Central placenta prævia, especially in a primipara, is generally regarded as a definite indication for a section, if facilities for the operation are at hand or can be secured. A third point is that, in the case just reported, no immediate action was taken to terminate the pregnancy. The rule is that once a definite diagnosis of placenta prævia is arrived at, the uterus should be emptied as speedily, gently and safely as possible. In this instance the fact that the patient was in a hospital where skilled aid was available at any moment and that the mother was about six weeks short of term on admission were the justifications for pursuing a Fabian policy. A fourth point is whether the ventro-suspension of the Gilliam type, done thirteen months before, had any bearing on the failure of the head to engage. It is not likely, as the round ligaments during pregnancy usually allow sufficient play to the uterus. The finding at the subsequent operation of a loop of bowel between the uterus and round ligament with the possibility of obstruction developing show a possible defect of round ligament shortening. Still another point is that a low section, or laparo-trachelorraphy,was done in place of a classical Cæsarean section, because the membranes had been ruptured for 52 hours, and it was felt that incision through the lower segment with a subsequent double peritoneal defence would better protect the patient against infection.

SENILE PULMONARY TUBERCULOSIS.—U. Masucci states that in spite of the studies of Charcot, Peter, Bertolotti, Hirtz, Etienne, Potain, and others, it is still generally supposed that tuberculosis is a disease almost entirely confined to youth. In reality, however, pulmonary tuberculosis not infrequently develops in an insidious and protracted manner even in advanced life, as illustrated by a case seen by Masucci in a man aged 79, by Sabatini in one of 85, and by Bozzi in one of 108. According to Goglia's statistics of necropsies, senile tuberculosis escapes recognition during life in 68 per cent. As regards the general symptoms, the characteristic tachycardia and arterial hypotension are absent owing to the existence of arteriosclerosis, which gives rise to hypertension and bradycardia. A rise of temperature at night, one of the most important symptoms of early pulmonary tuberculosis in young patients, is completely absent in a large number of cases, and slight and inconstant in others. Night sweats in old age are even rarer than fever. Physical examination does not as a rule show any definite evidence of disease, but Masucci has found in several of his cases of senile tuberculosis the following symptoms and signs which are constant in younger persons; the presence of micropolyadenopathy—small round painless glands mainly grouped at the site of the lesion; Boeri's sign—tenderness on pressure over the trapezius on the side corresponding to the lesion; dyspnœa; and recurrent slight hæmoptysis. The diagnosis, however, can be established in most cases by the search for tubercle bacilli in the sputum, and a radiological examination of the chest.—*Il Morgagni*, 1930, p. 2079.

Case Reports

AN UNUSUAL CASE OF UNILATERAL RENAL BLEEDING

BY EMERSON SMITH, M.D.,

University of Alberta,

Edmonton

Hæmaturia is an alarming symptom which only too often is indicative of a new growth in the urinary tract. In the majority of cases the exact diagnosis of the pathological condition is made with comparative ease, but in certain cases this is not possible. When the cause of the bleeding is not ascertained the term "essential hæmaturia" is used.

The following case is recorded because it is an example of a rare type of unilateral renal bleeding:—

D.C., a white male, aged 72, was admitted to the Royal Alexandra Hospital on March 1, 1929, complaining of passing blood in the urine.

Family History.—Negative.

Present illness.—The urine became bloody ten days before admission and had remained so since that time. There were no other genito-urinary symptoms. One week before a feeling of lassitude began and this had progressively become more marked.

Present condition. — Physical examination showed a well-preserved man, about 70 years of age, who appeared weak and tired. There was moderate arteriosclerosis and the blood pressure was 180/110. Abdominal examination was negative.

The urine showed gross blood; specific gravity 1016; albumin +; sugar, negative. Microscopically—numerous red blood cells, an occasional hyaline cast; no pus, no bacteria.

Blood count.—Hæmoglobin 70 per cent; red blood cells 3,800,000; white blood cells 7,000; the Wassermann test was negative.

Blood chemistry.—Non-protein nitrogen 38 mg. per 100 c.c.; urea 25 mg. per 100 c.c.; creatinin 0.9 mg. per 100 c.c.

X-ray examination of the urinary tract was negative for calculi.

Cystoscopy (March 2nd).—The urethra and bladder were normal; the ureteral orifices normal in position and contour. There was free bleeding from the right ureteral orifice; clear urine from the left ureteral orifice. The ureters were catheterized with ease. A pyelogram of the right side demonstrated a normal pelvis and all the calices to be well developed and well defined. The bleeding continued, and two days later, on March 4th, examination showed exactly the same findings as before.

The general condition of the patient became gradually worse. On March 9th the blood count showed: hæmoglobin 50 per cent; red blood cells 2,800,000; white blood cells 8,500. A right-sided nephrectomy was advised.

Operation (March 11th).—Under gas and oxygen anæsthesia, a curved incision was made in the right loin. The kidney was normal in position, size, shape and consistency. A nephrectomy was performed and the wound closed with one cigarette tube drain. The patient made an uninterrupted recovery and was discharged sixteen days after the operation.

Pathological report (Dr. Morton E. Hall).—"A right kidney of normal size with a slight amount of perirenal fat. The capsule strips readily leaving a few depressions. The external contour of pelvis of the kidney and hilus is normal. The stump of ureter is of normal size. On gross section the kidney is firm with markings distinct. The cortex is slightly narrower than normal.

On opening the pelvis of the kidney it was found to contain a small quantity of fresh free blood unclotted. The general appearance of the pelvic mucosa and calices is normal. At the superior margin of the upper calyx there is a small flat ulcer 3 mm. in diameter, with a bleeding point at its base from which the free blood found in the pelvis came and is the source of the hæmaturia. The ulcer has the appearance of an early flat peptic ulcer.

Microscopic section of the ulcer shows a round celled infiltration of the base with numerous eosinophiles present. The remainder of the pelvic mucosa is normal; a dilated vein in the tissue at the base of the ulcer contains a thrombus. Sections of kidney show slight diffuse atrophy of the epithelium of the tubules with a

few completely fibrosed glomeruli. The arteries show moderate sclerosis. The hæmaturia was due to rupture of a varicosed pelvic vein at the base of a small ulcer."

The above case presented a problem which is not uncommon in urology. There was unilateral renal bleeding sufficient to cause a gross secondary anæmia. The etiological factor present was not determined pre-operatively.

An explanation of this lesion is very difficult. There are four different types of pathological processes which may give rise to this condition:

1. Ulceration due to a transient inflammatory lesion of the kidney or pelvis which has disappeared by the time the examination is made. (Aschoff).

2. Patchy or diffuse fibrosis of the kidney with rupture of small vessel due to changes in vascular supply. (Payne and McNider).

3. Papillary bacterial nephritis of Orth, in which, due to blood-borne infection, a localized necrosis of the pyramids sometimes results.

4. Necrosis of the papillæ without the intervention of bacteria. (Chiari).

As a result of this comparatively insignificant lesion, (a small ulcer of the upper calyx) the kidney was sacrificed. From our experience of this case we believe that in cases of unilateral renal bleeding in which the urological examination is completely negative, and the history and general physical examination of the patient fails to reveal any of the usual causes of bleeding such as new growth, calculi, trauma, infection or underlying general condition, conservative treatment is indicated. Frequent pelvic lavage with silver nitrate, ½ per cent, through an indwelling ureteral catheter in all probability would have controlled the hæmorrhage and effected a cure.

SUMMARY

1. A patient, moderately arteriosclerotic, with persistent urinary bleeding.

2. History, general physical and complete urological examinations, negative.

3. Unilateral renal hæmaturia, producing a gross secondary anæmia.

4. The cause of bleeding was a small ulcer in the upper calyx, with erosion of vein at the base of the ulcer.

5. Treatment—nephrectomy.

6. In a similar type of case conservative treatment should be considered.

SOME INTERESTING CASES OF HYPERTROPHIC PYLORIC STENOSIS

BY R. R. MACGREGOR, M.D.,

Kingston

No mention of this condition is found in the writings of ancient physicians. In 1777 George Armstrong, an English physician, in his textbook entitled "An account of the diseases most incident to children from birth to the age of puberty with a successful method of treating them," described a typical case and noted the occurrence of several cases in his practice. This is the first description of the condition, as observed in the infant, on record.

Beardsley in 1788, in the transactions of the New Haven County Medical Society, under the heading "Scirrhus of the Pylorus in an Infant" reports a case which lived four months after the diagnosis was made. The report from post-mortem examination is contained in the following extract: "The pylorus invested with a hard compact substance or scirrhus which so completely obstructed the passage into the duodenum as to admit with greatest difficulty the finest probe." Williamson, in 1841 published a case, as did Liemon Dawoski in 1842; Landerer in 1879, and Maier, in 1885, described specimens taken from adults at autopsy that showed stenosis of the pylorus without evidence of inflammation.

The contribution of Hirschsprung, in 1888, is given credit in medical literature for awakening interest in this condition and reports of cases in increasing numbers followed his writing. In 1898 Cautley was able to record but 20 cases and in 1902 he could record but 50, 19 of whom had been operated upon. Ibrahim, in 1910, stated that up to that period 598 cases had been recorded. Since that time the number of cases recorded have increased to a very marked extent. For example, up to 1928, 312 cases were on record by Still of the Great Ormond Street Hospital, London. The same noticeably large increase in recorded cases is noted at other large hospitals for children particularly in Germany and the English speaking world where the greatest number of cases have been recorded. The recording of a case by Cautley in 1902, occurring in a seven month old fetus, is evidence to support the congenital origin of the condition,

a belief now held by most observers, although the possible post-natal origin of the condition still has its disciples of belief.

The clinical features and diagnostic points of the condition are so clearly marked as to afford little reason for comment.

It is interesting to follow the different methods of treatment devised in the past fifty years for relief of this condition. Loretta, in 1887, described his operation called "Divulsion of the pylorus" in which an incision was made into the anterior wall of the stomach and graduated sounds were passed into the pylorus. A number of recoveries were recorded from this operation. Dent, in 1902, advocated single pyloroplasty and reported recoveries from his operation. Behrend, in 1910, incised the pylorus and fed an infant through a catheter passed through the mouth, down through the pylorus. Gastroenterostomy then came into vogue as the surgical treatment of choice, and, as the mortality rate still continued high, so-called medical treatment was tried extensively, which in brief was characterized by the use of antispasmodic drugs, stomach lavage, and thick feedings, and was preferred by many to surgical measures. Ramstedt, in 1912, simply incised the pylorus, leaving the mucous membrane exposed, and his case recovered. This was followed by the general adoption of his method of surgical treatment and a very great lessening in the mortality rate. With improved methods during the past ten years of pre- and post-operative care and management few cases die of the disorder to-day. Of 15 cases observed by the author during the last five years in practice and hospital service no fatalities have followed surgical treatment, and all have recovered with no persistence of vomiting. The cases reported in this contribution while bringing no new light on the subject are of sufficient interest to warrant reporting.

Mrs. S., aged 40, alive and well was mother of seven children, six of whom are living.

CASE 1

The fourth child of Mrs. S., a male, was breast-fed and began regurgitating its feedings when it was one month old and lost weight rapidly. In one week from the beginning of regurgitations projectile vomiting after almost every feeding was observed. At seven weeks of age a diagnosis of pyloric stenosis was made and Ramstedt's pyloroplasty was performed. This infant died on the second day after operation, in convulsions. The surgical findings were enlarged stomach and a well marked hypertrophy of the pylorus.

CASE 2

The fifth child of the same mother, a male, was breast-fed and showed no symptoms until it was a month old, when projectile vomiting began quite suddenly, and the infant began to lose weight. I saw the case at seven weeks with the family physician and in addition to the characteristic history, typical visible exaggerated gastric peristalsis was observed. The infant was sent to hospital for operation. He was quite emaciated and dehydrated and previous to operation was given 150 c.c. of 10 per cent glucose solution subcutaneously and a transfusion of 75 c.c. of the mother's blood. On the second day following operation the temperature rose to 104° and the infant had several convulsive seizures. The convulsive seizures were controlled by chloral hydrate and the temperature fell to normal on the third day, followed by recovery. Ramstedt's pyloroplasty was performed. The surgical findings were a dilated stomach and a well marked hypertrophy of the pylorus. The child is now seven years old and apparently healthy.

CASE 3

The seventh child of the same mother was breast-fed for one week, then was given a feeding of a cow's milk mixture. It began vomiting at five weeks and began to lose weight. The vomiting became projectile at six weeks and exaggerated visible gastric peristalsis was observed after the infant took food or water. The infant was sent to hospital and Ramstedt's pyloroplasty was performed following a blood transfusion of 75 c.c. of the father's blood. The temperature rose to 104° on the second day, and the infant had several convulsive seizures. The convulsions were controlled by chloral hydrate. Improvement was noted on the third day, coincident with a fall in the temperature and uneventful recovery ensued. Surgical proceedings revealed as in the other cases a dilated stomach and a well marked hypertrophy of the pylorus.

COMMENT

While the present day methods of surgical treatment and general management of infants of this type are highly efficient and few infants die from the effects of the disorder in the present age, it still may be asked, what prenatal factors influence the development of the pyloric hypertrophy, and why do the great majority of cases occur in male infants and affect chiefly the first-born infants of families? Some interesting theories have been advanced to answer these questions, but they remain unanswered as far as any verification is forthcoming. The mother of these children says she suffered from intense anxiety during the war when her husband was overseas and has been in a highly nervous state ever since that time. It is interesting to note that her children born before the war or in the early days of the war were unaffected, and that three of four children born following the war were affected with pyloric stenosis. This leads one into speculation as to whether the mental and nervous state of the mother during the child-carrying period may have an indirect significance in the production of congenital hypertrophic stenosis, and whether in turn the nervous instability of a mother at maximum intensity before the first labour may help to explain the frequency of the disorder in the first-born infant.

REPORT OF A CASE OF RHINOPHYMA*

BY B. F. MACNAUGHTON, M.D.,

Montreal

W.G., aged 87, was admitted to hospital because of a growth on his nose which was so large that it obstructed his breathing, particularly when sleeping.

Sixty years ago he was struck on the nose with a cotton hook. He noticed that from the time of the accident his nose had gradually increased in size. During the last five years it had been particularly troublesome, falling down over the nares and obstructing his breathing. Thirty years ago he was badly burned on the neck and face leaving a cicatrix in the neck which caused an ectropion of the lower lip and slight ectropion of the lower eye lids. He had been a moderate drinker.

He was operated upon on October 6, 1930, under local anæsthesia. The growth was excised, and the nose pared down to the basal line of the sinus epithelium to a moderately normal size. There was no excessive bleeding and no skin graft was required. Complete epithelization took place in about twelve days.

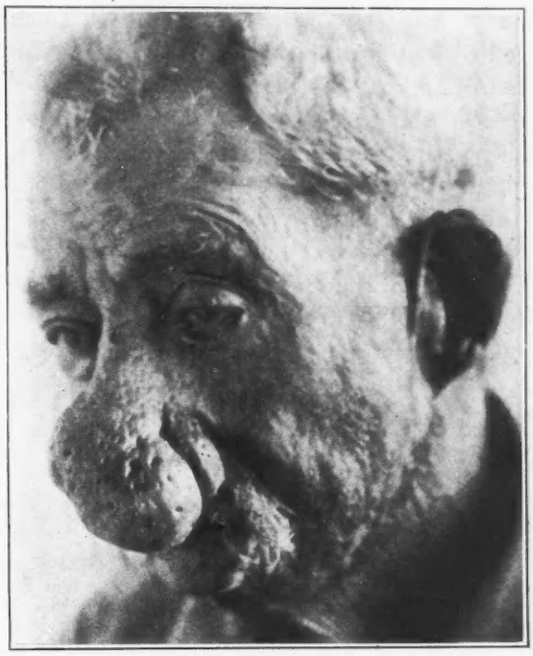


FIG. 1.—Showing hypertrophy of nose.

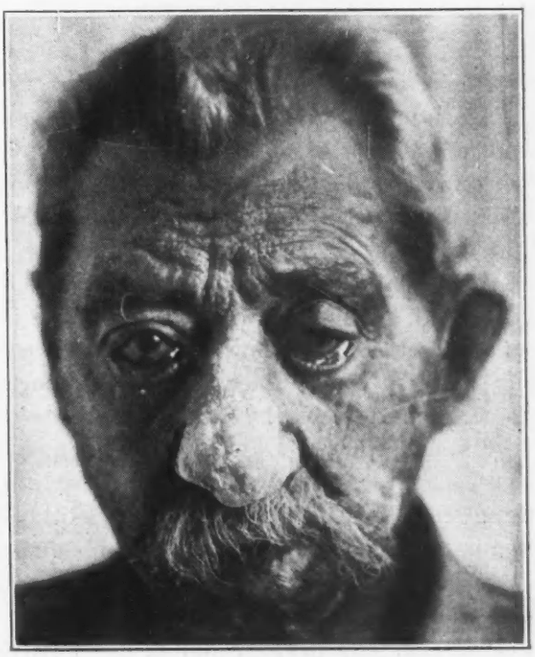


FIG. 2.—After operation.

* From the Department of Otorhinolaryngology of the Montreal General Hospital.

Rhinophyma is known under various names, such as "whiskey nose," "copper nose," elephantiasis of nose, hypertrophy of nose, acne hyperplasia, etc. The disease usually begins in the fifth to sixth decades, then takes 5 to 20 years to develop. There is probably no relationship to alcoholism. The commonly accepted theory is that rhinophyma represents the final stage of acne rosacea.

The essential pathological change is a hyperplasia of the soft parts of the nose, accompanied by a dilatation of the blood vessels and hypertrophy or cystic degeneration of the sebaceous glands. The skin follicles show in places distinct evidence of suppuration; the openings of the follicles and ducts of the sebaceous glands are widened so that they resemble deeply pitted pores, often giving the nose the appearance of a sponge.

Rhinophyma is a fairly common condition, though I can find no record of any operation done at the Montreal General Hospital over a period of ten years.

MERCURIALISM FROM THE EXTERNAL USE OF MERCUROCHROME—220 SOLUBLE

BY D. E. H. CLEVELAND, M.D., C.M.,

Vancouver

Most of the adverse comment concerning the use of mercurochrome refers to its intravenous use. A number of reports have been published of mercurial intoxication from intravenous injection, also from its application in cavities lined with mucous membrane. Mercurial dermatitis caused by its application to skin surfaces, as is sometimes observed in connection with the use of white precipitate ointment or bichloride lotions, is also known to occur, but few if any cases have been reported of general mercurialism resulting from its use on the skin. Indeed, Davis[1] in his exhaustive review of the uses of mercurochrome, when making reference to its use as a skin disinfectant, does not mention unfavourable effects. It may be considered, therefore, that the following case is exceptional, but nevertheless it indicates that the preparation is not entirely free from dangerous possibilities; a point to be remembered in its employment for such a common disorder as impetigo contagiosa.

Baby S. developed groups of vesicles about the neck and ears six days after birth. The attending physician ordered the application of a 4 per cent solution of mercurochrome and ultra-violet radiation. After rupture of the vesicles a slight suppuration occurred, but healing followed. Subsequent groups developed about the upper thorax and one arm and one leg, all of which were treated with 4 per cent mercurochrome. Sixteen days after birth a cyanotic swelling of the right thumb and index finger developed rapidly, and subsided as rapidly on the following day. Immediately after this a vivid red rash appeared first over the lower extremities, and extended rapidly over the body to the head. It was so intensely coloured and uniform that the possibility of scarlatina was considered. The temperature was not elevated.

I saw the child the first time on the following day, when it was 18 days old. The skin-lesions about the neck were healed and the remainder were progressing favourably. The skin of the greater part of the body and head was fiery red, rather tense and dry. There was a definite blueness of the extremities which had been increasing for some days. The child was irritable, and held the neck and body in a hyperextended posture, although there was no definite retraction of the head. There was much frothy saliva and the mucous membrane of the mouth was reddened. The salivation had been noticed first some three or four days previously, and the child had not been taking nourishment well. There was a trace of albumin in the urine, but no casts or red cells. The weight was 7 lbs. 14 oz. At birth it had been 8 lbs. 11½ oz. The application of the mercurochrome and the ultra-violet radiation was discontinued, and simple alcohol dressings were applied to the impetigo lesions. The following day the rash was paler, and the child more contented. Uninterrupted recovery ensued, and two months later the mother reported that the baby was in perfect health.

It may be remarked that the use of ultra-violet radiation in this case introduced a complicating factor, especially as the chemical concerned is a fluorescein compound (mercurochrome-220 is disodium-dibromo-oxymercury-fluorescein). In reply it is pointed out that the

ultra-violet radiations were used daily and simultaneously with the mercurochrome applications over a period of 12 days, that the ultra-violet ray was administered by a capable technician, taking precautions to avoid producing erythema, and that the erythema did not appear until the 11th day. Besides this, salivation and albuminuria are not accompaniments of actinic dermatitis, while they are characteristic of mercurialism.

I am not an unrestrained advocate of ultra-violet radiation in dermatology. I do not think it has any place in the therapy of impetigo contagiosa, believing that quite as satisfactory results can be obtained without it as with it. I have seen numerous cases in which it had proved inefficacious, including a number in which I am satisfied that the disease was aggravated by it. In impetigo neonatorum or bullosa where time is such an important element, no time should be wasted with radiation when we have such a rapidly efficient remedy as that placed in our hands by Smith and Burky[2] in the shape of alcoholic gentian violet. In spite of this, I consider that the ultra-violet rays may be exonerated of any complicity in producing the picture I have described.

The case may be summed up as follows. The lesions in a case of impetigo contagiosa in a new-born child, apparently otherwise healthy, were treated over a period of 12 days with 4 per cent mercurochrome. About the 7th or 8th day the child began to be salivated, failed to feed properly and lost weight, apparently due to soreness of the mouth, and on the 11th day developed a generalized erythema. At this time albumin was found in the urine. All these symptoms subsided rapidly upon withdrawing the mercurochrome. Two months later the child was reported by the mother as being apparently perfectly well.

The case is regarded as one of mercurialism due to the external use of mercurochrome.

REFERENCES

1. DAVIS, *Am. J. M. Sc.*, 1926, **172:** 340.
2. SMITH AND BURKY, *Johns Hopkins Hosp. Bull.*, 1924, **35:** 7.

STUDIES OF THE ETIOLOGY OF THE COMMON COLD.—In their studies of the etiology of the common cold, Gerald S. Shibley, Katherine C. Mills and A. R. Dochez, first directed their efforts toward displacing the common potential pathogens of the upper respiratory tract, such as pneumococci, streptococci, Pfeiffer's bacillus, stayphylococci, the Gram-negative cocci and the Gram-negative filter-passing bacteria, from the position of primary importance. Following these observations an effort was made to test the hypothesis that colds are caused by a filterable virus, one of those mysterious agents the exact nature of whose biological activity still remains obscure. They decided to use animals for the experiment, and in searching about for a suitable animal they discovered that anthropoid apes are supposed to catch colds. They found that chimpanzees are susceptible to the human type of upper respiratory infection; that the clinical manifestations noted when these animals catch colds closely resemble those seen in man under similar conditions, and that the bacterial flora of the nose and throat of chimpanzees is practically identical with that of man. Individuals suffering from suitable types of colds were sought out. In all, twenty-eight inoculations of chimpanzees have been made with filtered nasal washings from human beings. Of these, twenty were obtained from patients in the acute stage of the common cold and eight from normal individuals at a season of the year when colds were at their lowest incidence. Of the twenty experiments with filtrates from colds, four have been excluded since the inoculations were made in animals recently purchased and which had recently suffered from respiratory infection. Of the remaining sixteen animals, seven contracted experimental colds, ai incidence of 44 per cent of successful transmissions. The symptomatology of the experimental cold resembled exactly that of the spontaneous cold previously described. The usual incubation period was from thirty-six to forty-eight hours. The onset was characterized by lassitude, loss of appetite and the presence of a mucous nasal discharge. This was quickly followed by nasal obstruction, sneezing, coughing, and sometimes by inflammation of the pharyngeal mucosa. The mucous discharge eventually became mucopurulent and symptoms at times lasted as long as three weeks. Filtered nasal washings from human beings suffering from colds and from normal individuals have contained Gram-negative filter-passing anærobes in nearly the same proportion of instances. No evidence, however, has been obtained that these organisms have any etiological significance in the initiation of a cold. The experimental transmission of the common cold from man to man was next attempted. For this purpose human volunteers, preferably young adults, were secured. All physically unsuitable individuals and all who harboured possibly dangerous pathogens in their upper respiratory tracts were excluded from this type of experiment. At the termination of the period of observation and study the selected volunteer was inoculated intranasally with filtered nasal washings obtained from individuals suffering from the early stages of the common cold. In a number of instances plain sterile broth was injected intranasally to exclude and control any symptoms that might arise from the irritating effect of the broth itself. Irritation arising from this source was found to be negligible. Nine experiments of this type have been completed and in four instances colds have been successfully transmitted, a 44 per cent incidence of positive experiments, which is the same as that obtained in the study with anthropoid apes. Filter-passing anærobes were present in all the filtered nasal washings used in the studies of human transmission, both the positive and the negative results. The varieties of anærobes present were the same in the two instances. These organisms are not believed to possess primary etiological significance. The authors conclude that the contagious cold in human beings is caused by an invisible uncultivable, filterable agent which in all likelihood belongs to the group of so-called submicroscopic viruses.—*J. Am. M. Ass.*, Nov. 22, 1930, **95**.

Editorial

ANGINA PECTORIS

ANGINA pectoris, although a comparatively rare affection, is of intense interest to the physician. Described by Osler[1] as a disease of "the better classes," and rarely met with in the large hospitals, Clifford Allbutt[2] also states that in his own notes he found only one case in which manual labour would appear to have been the chief cause in its production. To-day, when more restraint is placed on heavy eating and drinking, it may be said to be an affection chiefly among those whose brains bear the burdens of the world. It is a disease frequently met with in our own profession, and has been the cause of death in a long list of its most distinguished members.

With the complete ignorance of all the facts associated with the circulation of the blood it is no wonder that during the long ages of the past the underlying causes of this dreaded affection remained obscure. Not until Harvey had revealed the course of the circulation did our profession gain an insight into its etiology. Our knowledge since then has made only slow progress, and even up to recent days no generally accepted explanation of the symptoms has been brought forward. Sir Clifford Allbutt, in his work previously referred to[3], states that Professor Huchard was said to have collected eighty different interpretations of the symptoms, but he contented himself by proposing for discussion only six.

In his Morison lectures, Dr. G. A. Gibson,[4] after delving into the literature of the past ages, presents us with an account of the brief references to cardiac pain in ancient records. In the Hippocratic treatises some reports of sudden death associated with severe pain in the chest are found, but Gibson regarded the references to anginal attacks as doubtful. Obscure, however, all past descriptions of cardiac pain must be, owing to the scant knowledge of the circulation then existing. Nevertheless, with our present knowledge of the amount of vascular sclerosis which existed in those past ages, anginal attacks must be regarded as probable and not very infrequent.

One of the earliest and most definite reports of an anginal attack is given to us by Seneca,[5] the Stoic philosopher, who writes in the early years of the first century a description of his suffering of which we present the following somewhat free translation: "I have experienced all bodily troubles and hazards but none appeared as bad as this; and why, because other experiences of disease may be regarded as simple illness; this experience was dying, and yet even in the act of suffocating I did not cease to derive satisfaction from pleasing and courageous thoughts."

This peculiar mental condition Gibson regards as characteristic of angina—a feeling of impending death with at the same time freedom from craven fear; a state of mind which may be defined as a condition of animated expectancy in which death, as depicted in the painting by Dürer, *Der Tod als Freund*, comes in the guise of a friend.

Although occasional indefinite references occur throughout the literature of the Middle Ages to death following sudden pain in the chest, the only definite description of a recurring anginal pain of which I am aware, is given to us by Lord Clarendon in his personal memoirs,[6] in which he describes the death of his father in 1632 from one of his well marked anginal attacks accompanied by agonizing pain in the left arm, a death-like pallor, and a feeling of impending death. Lord Clarendon adds that this fear of death was so constantly before his father that for many years he always parted from his son with the dread that he would see him no

1. Principles and Practice of Medicine, 1912, 8th. Edit. p. 836.
2. Diseases of the Arteries Including Angina Pectoris, London, 1915, **2**: 253.
3. *Vide supra*, p. 6.
4. *Edinb. M. J., New Series*, 1902, **12**: 9.
5. Opera Basil, 1529, p. 126.
6. Life of Edward, Earl of Clarendon, by himself, Oxford, 1759, p. 9.

more. The same gloomy anticipations were experienced by John Hunter[7] and Charles Sumner.[8]

Notwithstanding this clear description of the disease by a non-professional writer, it was not until 1761 that Morgagni[9] presented to the profession a well reported case of a patient 42 years of age who died suddenly during a paroxysm of pain and in whom the existence of an aortic lesion was revealed by the subsequent autopsy. Some seven years later Nicholas François Rougnon[10] described the case of another patient in whom pain in the anterior part of the chest was followed by sudden death. The condition was attributed by him to ossification of the costal cartilages, an unfortunate misconception antagonizing the previous report of Morgagni. A short time afterwards (1772) Heberden[11] presented to the profession a clear picture of this disease, drawn from a careful study of twenty cases, a study extending over more than twenty years, and one to which little addition has been made since. Although Heberden in his first paper did not specify the definite cardiac lesion which he regarded as the cause of the syndrome, disease in the coronary arteries was shortly afterwards specifically associated with the occurrence of the attacks by Fothergill[12] and Jenner.[13] Jenner however withheld the publication of his observations in consideration of his feelings for John Hunter who had begun to develop symptoms of the disease.

A definite addition to medical thought regarding the cause of the disease was made by Allan Burns[14] in 1809, who called attention to the fact that interference with the blood supply of the heart muscle might be a source of anginal pain. In this communication he to some extent forestalled the later speculations of Charcot and Potain. Laennec in the second edition of his work (1826) stated that he considered anginal pain to be simply a form of neuralgia; Eichwald[15] in 1863 recognized the possibility that cardiac pain might be induced in an overtaxed muscle under an increased strain. The investigations of Lancereau[16] in the next year led to a recognition of the part that the nervous connections of the heart might take in this affection.

Sir Clifford Allbutt, in 1893, in his book[17], and in several papers strongly stressed the opinion that this disease was not primarily of cardiac origin, but in a large proportion of cases was due to disease in the aorta, an opinion shared by Osler, and by many authorities. A later theory was propounded by Sir James Mackenzie, writing in 1905 in the *British Medical Journal*,[18] in which he insisted that there must be some condition underlying the various lesions found post mortem in this disease, and this predisposing cause he considered to be an impairment of the contractility of the heart muscle associated with a hypersensitive condition in the vasomotor system. Osler, in an article written in 1910 to the *Lancet*,[19] quoted these views of Mackenzie's, and said that in his opinion the symptoms were due to a rapid exhaustion of the function of contractility in the heart muscle. This condition might be brought about by any interference with the flow of blood through the coronary arteries of the heart, and he quoted as an example of a similar pain the pain induced in arteriosclerotic patients by intermittent claudication.

The importance of disease in the coronary arteries interfering with an efficient supply of blood to the cardiac muscle has been gradually gaining acceptance with the profession as the chief factor in this disease. Our knowledge of disease in the coronaries has also greatly increased during the past fifteen years[20]. Cohnheim[21] in 1881 investigated the effects of ligation of the coronary arteries in dogs and found that complete obstruction was followed by sudden pain and

7. Everard Home, in A Treatise on the Blood by the late John Hunter, London, 1794, p. 45.
8. Taber Johnston, *Boston M. & S. J.*, 1874, **91**: 365.
9. De Sedibus et Causis Morborum, Venice, 1761, Tom. 1, p. 282. Bk. letter 26, art. 31.
10. Lettre à M. Lorry, Besançon, 1768.
11. *Med. Trans. Roy. Coll. Phys. Lond.*, 1772, **2**: 59.
12. Med. Obs. Soc. Phys. London, 1776, **5**: 233 and 252.
13. C. H. Parry, An Inquiry into the Symptoms and Causes of Syncope Anginosa, London, 1799, p. 69.
14. Observations on Diseases of the Heart, Edin., 1809, p. 138.
15. *Würz. med. Zeitsch.*, 1863, 249.
16. *Gaz. Méd. de Paris*, 1864, p. 432.
17. Diseases of the Arteries including Angina Pectoris, 1915, **2**: 351.
    N. Y. Med. J., Feb. 15, 1922, **115**: 181.
18. *Brit. M. J.*, Oct. 7, 1905, **2**: 845.
19. *Lancet*, Mar. 10, 1910, **1**: 697.
20. Klotz and Lloyd, *Canad. M. Ass. J.*, Sept., 1930, **23**: 360.
21. *Virchow's Arch. f. path. Anat.*, 1881, **85**: 503.

death. Later investigators[22] have modified this statement. If the lesion encroaching upon the lumen of the vessel be a slowly progressive one a considerable degree of compensatory anastomosis may be developed. The anatomical studies of Louis Gross[23] have shown that the amount of possible anastomosis varies greatly in different individuals with age and with the slowly increasing demands due to disease. Scleroses of the coronary artery are prone to be multiple, and if they affect the arteries in both ventricles myocardial damage is a certain sequel.

A recent study of the effect of the partial, and complete occlusion of the left coronary artery in dogs[24], appears to have shown that such occlusion induced the most severe pain. Its severity varied with the completeness of the occlusion, while acute mechanical distension of any portion of the aorta failed to induce symptoms indicative of pain. We note that Professor Means, whose address we publish in this issue[25], considers that these investigations appear to disprove the view that disease in the aorta of itself plays an important part in the causation of anginal attacks.

In opposition to all these views we may cite Mr. Walter Virdon's[26] elaborate essay in which he affirms that the important predisposing cause of the seizures lies in the hyperexcitability of segmentary nervous centres, and that the gastro-œsophageal tract is in many cases the seat of the exciting cause[27]. Cases undoubtedly occur in which the most careful scrutiny fails to reveal disease either in the aorta or coronary vessels; and in which gastro-œsophageal spasm appears to play a very, if not the most, important part.

We therefore commend to our readers the advice of Professor Means to regard angina pectoris as a complex syndrome and to study carefully all the possible factors in each individual case.

A. D. B.

22. Hirsch and Spalteholz, *Deut. med. Wchnschr.*, 1907, **33:** 790.
23. Gross, The Blood Supply to the Heart, New York, Paul Hoeber, 1921.
24. Sutton and Lueth, *Arch. Int. Med.*, June, 1930, **45:** 827.
25. *Canad. M. Ass. J.*, 1931, **24:** 193.
26. Angina Pectoris, London, Baillière, Tindall, and Cox, 1920, p. 85.
27. l. c., 125.

RECENT STUDIES ON PSITTACOSIS

THE first recorded epidemic of "parrot disease" occurred in Switzerland in 1879; the next considerable outbreak, in Paris, in 1892. Since this date the disease has been met with only at intervals, and in limited extent, in some other countries, notably Germany, England, and the United States, though it is quite probable, from what we know now, that isolated cases and small outbreaks have occurred here and there which have gone unrecognized. Human cases of psittacosis were recorded in the United States in 1904, 1906, 1925, and 1927. The recent outbreak of 1929-30 was the most extensive of all, and might almost be termed a pandemic, as it occurred in many widely separated countries, Algeria, Argentina, Austria, Canada, Czechoslovakia, Denmark, England, France, Germany, Hawaiian Islands, Holland, Portugal, Spain, Switzerland, and the United States. It has been carefully studied, and, while complete statistics are not available at the moment, some eighty cases are reported from England and one hundred and eighty-five from the United States, so that we are now in a position to analyze the material with a fair hope of obtaining somewhat complete and accurate information. The clinical aspects of the disease are now well known, and while the specific microbic cause has not yet been isolated progress in that direction has been made, and we at least know what it is not. Those who desire full information can obtain it from the valuable reports recently issued by the Ministry of Health,[1] of Great Britain, and the Public Health Service of the United States.[2]

Psittacosis in its clinical course resembles influenza and, more strikingly, typhoid fever. The incubation period is from four

1. Reports on Public Health and Medical Subjects, No. 61, (Psittacosis), Sturdee, E. L. and Scott, W. M., London, H. M. Stationery Office, 1930.
2. U. S. Treasury Dept., Public Health Service, Psittacosis, Armstrong, C., Reprint No. 1406, Pub. Health Rep. 1930, **45:** 2013.

to ten days, usually about ten. The onset may be sudden, with chilly sensations, headache, and fever, or gradual, with a few preliminary days of general malaise. Epistaxis occurs in about one-quarter of the cases, usually on the first day. The temperature when first taken is usually from 100° to 102°F, rising with irregular remissions to 103° or even 105° during the second week. Headache is a constant feature at the beginning, reaching its maximum intensity at about the tenth day, then gradually diminishing. Sore throat is frequent, the fauces and soft palate being congested and sometimes covered with a yellowish exudate. The pulse is apt to be slow, considering the temperature. Herpes labialis occurs, but is not common. The tongue is, as a rule, covered with a thick white or brownish coating, and has red edges, but may be dry and cracked. The appetite is lost and constipation is the rule. The abdomen may be distended. Albuminuria is quite common after the disease is well under way, and retention of urine may be present. "Rose spots," or similar skin lesions, were noted in nine out of eighty cases in the English series, and occasionally in the American. The leucocytic count is unually normal or slightly above normal for the first few days, but leucopenia is the rule later on. In one case in the American series the count was as low as 600 on the twentieth day of the illness, but counts of from 3,000 to 5,000 were more common.

At first the patient feels comparatively well, despite the chills, fever, and headache, but towards the end of the first week becomes greatly prostrated, stuporose, and intermittently excitable. An important symptom is cough, which is present in about eighty per cent of cases. This gradually increases in severity until it becomes frequent and racking, exhausting the patient, preventing sleep, and aggravating the headache. The expectoration is very scanty, sometimes absent, and is usually mucoid, but may be mucopurulent or purulent. Patchy spots of consolidation appear in the lungs, fusing together so as to form considerable areas in one or both lungs. A curious feature, ordinarily, is the absence of rapid or laboured breathing, even when the signs of pneumonia are extensive. Orthopnoea apparently was not observed.

The duration of the illness is about two or three weeks, but occasionally is extended to eight weeks. Convalescence is tedious and may be delayed by relapses. The commonest complication is thrombophlebitis of the femoral vein.

The mortality rate is close to 20 per cent. In the American series, of 35 patients under thirty-five years of age none died; of those above this age approximately 24 per cent died. Death is probably due, in the main, to the pneumonic involvement, and usually occurs from the seventh to the fifteenth day of illness. Deaths occurring later are apt to be due to the loosening of a venous thrombus. Marked involvement of the nervous system presages a serious attack, and absolute coma usually terminates in death.

The pathological lesions found at autopsy are those of a generalized septicæmia, complicated with pneumonia. The pneumonia, however, does not resemble the classical pneumonia or bronchopneumonia. The lungs are intensely engorged; there is increasing hæmorrhage; there is proliferation and desquamation of the epithelium, with leucocytic infiltration. A free amount of exudate in the alveoli is found, at first serous but later fibrinous, and a capillary thrombosis which may extend to the pulmonary arteries. Areas of degeneration and hæmorrhage are met with in the muscles, chiefly in the recti. There is parenchymatous degeneration of the kidneys and liver, and the spleen is often red, soft, and diffluent. Severe lesions are not found in the gastro-intestinal tract. Congestion and œdema of the brain and cord are common.

The diagnosis should be made fairly readily. The previous association of the patient with a sick parrot or other climbing bird will be suggestive. The outbreaks in their extension affect a household rather than a community. This will help to differentiate the disease from influenza. The character of the pneumonia differs from that of the pneumonia found in influenza and typhoid fever. As will be gathered from the above description, the resemblance between typhoid fever and psittacosis is close. Many of the features are identical. However, pneumonia is common in psittacosis,

rare in typhoid. A carefully performed Widal test may be of help. Blood cultures, made early, would likely be positive for *B. typhosus* in typhoid fever, and consistently negative for this organism in psittacosis. Intestinal hæmorrhage and perforation are, of course, not found in the latter disease.

The wide dissemination of the reported cases of psittacosis in the latest outbreak would seem to indicate that the infection must have originated among birds collected by the original dealers in South America, rather than among those handled by dealers in the individual countries concerned. So far as can be learned, the disease is not very prevalent among birds in their natural habitats, but once it occurs may extend fairly easily among those herded together in transit and in stores, particularly when they are taken from the tropics to the temperate regions during the colder months. Parrots, parrakeets, and budgerigars, are the birds usually attacked, but canaries and even thrushes have been known to suffer from the disease. Human beings are usually infected through rather close association with ailing birds, but a few undoubted instances of man to man transmission have been recorded.

With regard to the specific cause, it is now settled that psittacosis is not due to Nocard's organism or any bacillus of the Salmonella group. R. D. Lillie[3] reports finding Rickettsia-like bodies in the case of three affected parrots and one human case, which were absent in control cases. He does not claim an etiological role for these bodies, however, but thinks that their occurrence is suggestive and merits further study. The most widely accepted view at present, based on the researches of Drs. S. P. Bedson, G. T. Western, and S. Levy Simpson, of the London Hospital, is that the disease is due to a filterable virus. Dermotropic and neurotropic affinities manifested by this agent in rabbits after passage through mice suggest that it may belong to the same group as the herpes virus. A.G.N.

3. *Ibid.*, Psittacosis, Lillie, R. D., Rep. No. 1366, 1930, **45:** 773.

THE DOCTOR'S OWN CONTRIBUTION TO THE DEATH RATE

THE physician has ever been noted for his singular inability to heal himself. He has sometimes been compared with the cleric who enjoins parishioners to do as he says, not as he does. At times it is suggested to him that when a lawyer defends himself he has a fool for his client. Such kindly jibes cause the doctor no concern. He is familiar with statistics which show that he belongs to the group which has the highest death rate of the groups classified as the learned professions. He makes no boast of this distinction. It may seem somewhat anomalous, but facts are facts, so why worry?

On the basis of the census of England and Wales taken fifty years ago, Dr. William Ogle computed the comparative mortality figure of medical practitioners at that time to be 1,122. For barristers and solicitors the figure was 842; for clergymen it was 556. A recent paper by Dr. E. Graham Little[1] gives some consideration to the census for 1921. It may be explained incidentally that Dr. Little's paper deals largely with the prospective status of the profession should a nationalized medical service come into being. He is quite evidently not hopeful that such a service will prove highly satisfactory, but surmises that it would tend to make the comparative mortality figure of physicians approximate more closely to that of civil servants, whose "sheltered lives" place them in a relatively favourable position, and for whom the figure is 739. *Inter alia*, we learn that "while the rate of suicide is especially high for doctors it is especially low for civil servants."

Perhaps the most arresting feature of Dr. Little's paper is his discussion of the causes of death. For statistical purposes the population is divided into five social classes, and physicians are included in the "upper and middle class"—the first class of the category. We are considering occupied and retired civilian males of ages 20 to 65, who constitute

1. *J. State Med.*, 1930, **38:** 12, 684.

only 2.3 per cent of the total of such males. The general mortality of medical men is not much higher than for others in this class, the comparative figure being 1,021 as against 1,000 for the class as a whole. (This figure, of course, is not comparable with that of Ogle, who dealt with the whole male population rather than with a selected group). But "acute non-tuberculous respiratory diseases, influenza and pneumonia, seem a special risk for the doctor, perhaps to be explained by the conditions of his life; the accident ratio is also high, more than double the average for Class 1." While this is not a very surprising statement, and must perhaps be expected to remain true, we are now to experience a distinct shock. The cancer rate for Class 1 as a whole is 80, but for doctors it is 180. This should surely cause us to question ourselves. Can it be that doctors, who urge the importance of early diagnosis of cancer, are less likely than the laity to suspect the importance of its early manifestations in their own persons? Or do they fail to do themselves what they instruct others to do? Or do they imitate the lawyer who pleads his own case? Or is there a "hoodoo" of medical men?

Cancer stands at the top of the list of the causes of death of physicians. Next in order of major causes come diseases of the heart, other than valvular (rate 152), pneumonia (140), cerebral hæmorrhage (129), arteriosclerosis (124), chronic nephritis (75), valvular disease of the heart (63), influenza (61), respiratory tuberculosis (61), accident (59). Several of these conditions loom large in our hope for results from the periodic health examination. How often should the physician submit to such examination? It cannot be claimed that the statistics of England and Wales necessarily apply to Canada. We have no statistics which admit of comparison, so we are left in doubt. It may, however, be reasonably assumed that we do not differ greatly from our English colleagues in respect of mortality experience. At any rate, there is interest for us in Dr. Little's endeavour to explain the high incidence in medical men of some of the conditions mentioned above.

In respect of cancer: "The view that cancer is due to ageing of the tissues, and that this ageing occurs more rapidly in some occupations than in others, may explain its increased incidence in those who work with their minds, like doctors, to their utmost capacity; the mind may wear out the body much more effectively than the body wear out the mind." Brief reference is made to the possible association of high living, alcoholism, syphilis and smoking. "Comparison of occupation in connection with the mortality of cancer throws some interesting light upon these theories of causation. The occupation providing the lowest ratio is that of the clergy of all denominations, but especially of the Protestant communions. This exceptionally low mortality of the clergy from cancer may be associated with the equally low mortality from syphilitic diseases. Cirrhosis of the liver is also low in this group. It is somewhat remarkable that the figures would appear to contradict any association between gastric (or peptic) ulcer and cancer of the stomach. If this conclusion be correct, chronic indigestion would appear to play a much smaller part in the production of cancer than has hitherto been assumed. The remarkable freedom from cancer displayed by the group of clergy, which has the lowest ratio of all occupations, points the moral that medical practitioners should endeavour to imitate as far as possible the habits of the sister profession if they wish to avoid cancer."....."Conditions which are thus shown to increase the incidence of cancer—excessive smoking, spirit drinking and exposure to venereal infections —are risks to which the medical profession are perhaps from their special circumstances particularly vulnerable."

Diseases of the heart other than valvular: —Their prevalence "suggests the importance to medical men of elimination of foci of septic infection as soon as they are recognized."....."One can only drop the hint that septic teeth, and septic tonsils, when occurring in himself, should be treated by the doctor with quite as much care as they would be treated if they occurred in his patients."

That doctors should be especially subject to pneumonia is not surprising if exposure to infections and to trying alternations of temperature are accepted as important causal factors.

Cerebral hæmorrhage is so closely associ-

ated with chronic nephritis that consideration of the latter really covers both conditions. "Chronic nephritis is intimately linked up with alcoholism, the correlation between cirrhosis, which means chronic alcoholism, and nephritis being high. The part played by exposure in the production of nephritis may, as in the case of pneumonia, explain something of the increased incidence in doctors. Exposure to weather probably explains also the increased incidence of influenza and respiratory diseases in general. The habit of taking precautions against chill would, indeed, seem to be one of the most important for the doctor to cultivate, and one which he is especially prone to neglect. How frequent it is to see a doctor pass from the super-heated atmosphere of the operating room into an open car without donning an overcoat; how dangerous this procedure may be is amply borne out by the statistics and comments of the Report."[2]

In general summary Dr. Little says:—

"Probably the salient impression which leaps from their consideration is that the average doctor, that is the man in general practice (general practice absorbing an enormously great proportion of medical men), suffers his principal risks from the length of the working hours, the mentally wearing character of the occupation and the very decided effects of exposure to changes of temperature."

All of the above is submitted for the thoughtful consideration of our readers. In the endeavour to save others we must take risks which are often appreciated by the laity, many of whom are charitably disposed to excuse our frailties because of the sacrifices we make. It may well be asked, nevertheless, if all these risks are necessary, and if we would not serve others better by being more careful of ourselves. In our efforts to reduce the general death rate, should we not endeavour to see that our own contribution to that rate is lessened? Is it really creditable to us that the death rate of doctors is so tragically high? W.H.H.

2. "Report" is that of the Registrar-General, England and Wales for 1921.

Editorial Comments

The Tercentenary of the first recognized Use of Cinchona Bark by Europeans

The three-hundredth anniversary of the first recognized use of cinchona bark by Europeans was celebrated in London recently in a rather striking fashion. The Wellcome Historical Medical Museum signalized the event by arranging a special exhibition and holding a number of receptions. On December 8, 1930, H. E. Cardinal Bourne took the Chair, and H. E. the Marquis de Merry del Val, the Spanish Ambassador, delivered an address, and M. A. de Fleuriau, the French Ambassador, and Senor Don A. Gonzalez-Prada, Envoy-Extraordinary for Peru, also spoke. In the evening H. E. Jonkheer R. de Marees van Swinderen, Minister for the Netherlands, presided, when Archbishop Goodier, S.J., gave the address, and General C. G. Dawes, Ambassador for the United States, and Prof. F. van der Wielen, of Amsterdam, also spoke. On succeeding days Sir David Prain gave a lecture on the "History of cinchona bark"; Sir Humphry Rolleston, one on the "History and therapeutics of cinchona"; Sir Charles MacWatt, Director-General, I.M.S. (1922-26), on "Malaria and cinchona in India;" Dr. P. Manson-Bahr, on "Quinine therapy in malaria from the standpoint of the Practical Physician"; and Dr. C. M. Wenyon, Director-in-Chief of the Wellcome Bureau, on the action of quinine in malaria.

The story of cinchona reads like a romance, for it takes us back to the bold, bad, buccaneering days when soldiers, sailors, priests, poets, nobles and peasants, saints and sinners, jostled elbows in the lust of conquest and the mad race for gold. As is the case with certain other valuable remedies and remedial appliances, we owe cinchona not to the medical profession but to the laity, in this instance the Indians of Peru, who used it in the treatment of malarial and other fevers. If its use was empirical then, it is still empirical, despite much laboured research.

As regards the first medicinal use of cinchona bark on Europeans in 1630 there is excellent authority for the statement that when Don Juan Lopez de Canizares, the Spanish corregidor of Loxa in Ecuador, then a province of Peru, was taken ill with an intermittent fever he was cured by an Indian cacique of Malacotos, who revealed to him the curative properties of the bark and the proper way to administer it. The Jesuits soon afterwards sent supplies of the wonderful bark to Spain.

The distinguishing botanical name of the

genus—Cinchona—was devised by Linnaeus, somewhat incorrectly, but suggested by the titular name of Francisca Henriquez de Ribera, Countess of Chinchon, the wife of the Viceroy of Peru, who was cured of fever at Lima, in 1638, by the use of the bark. The native Peruvian Indian names, quinaquina, quinquina, kinakina and kinkina, have formed the root-stems for the designations not only of the bark but of its derivatives. It is an interesting point, noted by Sir Clements Markham, that "in Quichua, when the name of a plant is reduplicated it almost invariably implies that it possesses some medicinal qualities."

A Jesuit priest, who subsequently became a cardinal, took cinchona bark to Rome in 1639. From Italy the drug reached the Netherlands and then England. It became the vogue. An apothecary, Sir Robert Tabor (Talbor or Talbot) who was attached to the court of Charles the Second, gave great offence to the regular physicians by curing the King with it. He was sent to France to cure the Dauphin of an ague. When the Dauphin recovered, Tabor received the title of Chevalier, a pension of £100 a year, and £2,000 for the secret of "the Englishman's cure," which was merely an infusion of a considerable quantity of the bark in claret. The great Sydenham took it up, and his success with it probably influenced him in concluding that each disease should have its specific remedy. Neuberger said that no other drug did so much to upset the current theories in medicine; Ramazzini said that cinchona did for medicine what gunpowder had done for war. Cinchona was discussed over what corresponded to the bridge tables of the day. In 1681, Mme. de Sévigné wrote that it would soon become the fashion to take bark after every meal, like tea or chocolate; a great poet, Lafontaine, wrote a long poem eulogizing "quinquina"; Racine said that he did not know the honest man who, if he had taken cinchona without effect would dare to say so. So much for fashion!

Some interesting points emerged from the addresses. Some thirty alkaloids have been isolated from cinchona bark. The most powerful antiseptic is quinine, followed in order by quinidine, cinchonidine, and cinchonine; quinidine is the most efficient in restoring the normal rhythm of the heart in auricular fibrillation and flutter. How quinine acts in curing malaria is not certainly known. In general all the cinchona derivatives may be regarded as protoplasmic poisons. A specific action on nerve terminals may explain the anæsthetic effect of quinine. Possibly quinine acts on the malarial parasites indirectly by developing a new metabolite in the blood, or it may excite the formation of antibodies, or, again, it may form a film upon the red blood corpuscles, thus preventing the entrance of the plasmodia. Apparently, too, there is some doubt as to the efficacy of quinine as a prophylactic of malaria. Thus, another cherished conviction is gone.

The exhibit in the Wellcome Museum seems to have been large and well chosen, and the catalogue issued in connection with it is a beautifully produced volume, well illustrated, and full of valuable information about cinchona, its derivatives, and cultivation, and the methods of malaria prevention. The exhibition not only contained samples of the various species of cinchona, but also of the different alkaloids, photographs showing methods of cultivation, books, pamphlets, posters, and numerous other articles pertinent to the subject. H. M. the King of Spain sent original serons, or containers for cinchona bark, brought by Rinz and Pavon from Peru in 1777. Other interesting items were a self-portrait by Albrecht Durer, in which he depicts himself as the victim of malaria, and a copy of a painting in the crypt of St. Peter's at Rome, known as the Madonna della Febre. The exhibition in short covered the whole gamut of the subject from the discovery of the therapeutic value of bark until the present day of scientific research.

A. G. N.

Ringworm of the Feet (Athlete's Foot)

We have recently had a request for information regarding the occurrence of "athlete's foot" in Canada. This term is an unfortunate one, for the disease, which is a dermatitis due to a mould, epidermophyton, is by no means confined to athletes. A more convenient as well as more accurate name is that usually employed by the dermatologists, namely ringworm of the feet. But the public are apt to shrink from admitting that they are suffering from a disease to which they attach such a loathsome stigma as "ringworm", while they only mildly deprecate their ownership of "athlete's foot". There is, of course, a repellent and unwelcome aspect which has been fully earned by ringworm of the scalp, but milder, less disfiguring and more tractable forms of ringworm in other parts of the body are well recognized. However, as "athlete's foot" there may be less trouble in ascertaining its incidence in Canada.

Some striking figures have been published regarding this form of ringworm in American universities. In the fall of 1928, for example, examination of the freshman class in the University of California showed that 52 1/3 per cent of the men and over 15 per cent of the women were infected with it,[1] and these figures were not as high as those from other sources. Further, these percentages were increased by about 25 per cent amongst the men and 2 per

---

1. LEGGE, *et al.*, *J. Am. M. Ass.*, 1929, **92**: 1507.

cent amongst the women when they were examined some months later,[2] making it obvious that the disease was easily spread

We can find no special reference to its incidence in Canadian universities, or other institutions such as the Y.M.C.A., public baths, golf clubs, etc. We are informed, however, that cases are not infrequently seen in our dermatological clinics. It must be remembered however, that there are minor forms of it which are not always easily detected. The individual may be unaware of its presence for some time. The clefts of the toes have to be closely inspected to discover the smaller patches, and, as pointed out by Williams and Barthil,[3] the toenails may serve as unnoticed foci which will continually reinfect the feet. At the same time, it should be remembered that the skin of the clefts between the toes is peculiarly apt to become fissured, or scaly, or sodden, from causes other than ringworm. It is possible that neglect to confirm the diagnosis by microscope or culture accounts for the very high incidence described in the United States by some authors.

It is true that this affection does not compare with ringworm of the scalp in its seriousness and obduracy, but it is none the less a highly infectious form of dermatitis which may be extremely difficult to eradicate and occasionally may become crippling. It is in the universities that the best opportunity exists for its detection, and we would draw the attention of physical directors to it as a potential menace of considerable gravity. H. E. M.

2. *Ibid.*, 1929, **93**: 170.
3. *J. Am. M. Ass.*, 1929, **93**: 907.

X-Ray Equipment in Small Hospitals

The increasing number of small rural hospitals, the increasing demands of both the profession and the public for better diagnostic facilities, and the increasing number of traffic accidents have all combined to augment the number of installations of roentgenological equipment. Perhaps the laudable desire of local organizations to present some tangible gift to the local hospital has been as potent a factor as any. What should be the extent of equipment for these small hospitals? This question has been presented many times by hospital boards to our Department of Hospital Service.

A point well taken by Dr. E. E. Shepley at the recent hospital association meeting in Saskatoon was that the equipment should never exceed the qualifications of those who are to operate the apparatus. Beyond this point equipment is wasted or diagnoses become dangerous. For the average small hospital the excellent and comparatively inexpensive portable machines now available would suffice for all fracture and general emergency work. Difficult abdominal or chest diagnostic work and deep therapy might well be done in larger centres. Dr. Shepley also pointed out that the average hospital spends too much money on the machine proper and not enough on accessories, on dark room equipment, and on technical assistance.

A comment often made by roentgenologists is that all too frequently the films sent to them for diagnosis from small hospitals are so poorly taken that it is almost impossible to make from them any trustworthy observations. This is to be regretted as the patients concerned and their physicians place considerable reliance upon these reports. Better work is quite possible with much of this equipment, and one factor in the solution seems to lie in the insistence upon better training of the technician or nurse operating the machine. A number of the larger hospitals and private roentgenological laboratories offer short courses of training upon request and more of these smaller hospitals, as finances permit, should avail themselves of this privilege.

G. HARVEY AGNEW

The Archives of Disease in Childhood

The last number of the *Archives of Disease in Childhood*, a bi-monthly journal published by the British Medical Association, contains several articles of interest not only to pædiatricians but to the profession in general.

Dr. Clifford Grulée, of Chicago, contributes a paper on Intraperitoneal Therapy. The administration of fluids or drugs to children, he states, may often be a matter of difficulty. Vomiting, or a very definite refusal to take fluids may hamper oral administration. Hypodermoclysis is painful, and its possibilities are limited. Fluids administered by the rectum often are not retained, and the small size of their veins makes intravenous injections more or less impracticable. It has been well established by Poynter and others that materials injected into the peritoneal cavity are taken up by the body with extreme rapidity and without harm to the organism. The thoracic duct, the pulmonary lymphatics, and the venules of the omentum are in his opinion the more important avenues of absorption. The writer discusses the various methods for the injection of nutritive fluids, injections of blood, and the introduction of medication by this route including the administration of anti-syphilitic drugs, of diphtheria antitoxin, and of iron. The dangers connected with this method of therapy are infection, undue distension from the use of too

large quantities, and reactions for the most part slight and unimportant. The advantages are noteworthy if the cases are properly chosen.

J. J. Giraldi, of the University Centre of Cardiac Research in Bristol, contributes an article on Abdominal Symptoms occurring in Acute Rheumatism. He states that in recent treatises on disease in childhood he finds no notice of any digestive or peritoneal symptoms in this disease, but by older writers the existence of such symptoms was recognized. Giraldi discusses three groups of symptoms connected with the abdomen met with in rheumatic fever; those of a digestive group; those simulating acute appendicitis; and a group simulating peritonitis. He reports several cases in each group and draws the following conclusions: (1) Digestive symptoms may precede the onset of acute rheumatism more frequently than is at present realized; (2) symptoms simulating an acute appendicular inflammation may occasionally be met with; and (3) although peritonitis is a rare phenomenon in very acute cases of the disease some evidence of the invasion of the peritoneum by the rheumatic virus may be found.

Another interesting paper, which comes from the Children's Hospital in Birmingham, directs attention to the influence of the salicylates on the blood constituents in acute rheumatism. The writer after a careful investigation of the blood constituents in acute rheumatism before treatment by the salicylates, finds that the blood urea and non-protein nitrogen remain higher than normal, apparently due to the fact that the kidney in rheumatism is unable to deal quite adequately with these products owing to some impairment of renal efficiency, the result of the acute rheumatic infection. Nevertheless, after salicylate treatment is commenced the blood urea reaches a still higher level than before the administration of the salicylates, indicating that salicylates do increase to some extent the degree of renal inefficiency.

Other interesting papers in this issue are one on the Nirvanol treatment of Chorea, by Oliver Tisdall, of the East London Hospital for Children; and one on Erythro-œdema and its Treatment, by G. B. Sweet, of the Auckland Hospital in New Zealand. In the latter paper the writer claims good results in the comparatively few cases he had to treat from exposure to the rays of a radiant heat lamp for five minutes followed by exposure for three minutes to ultra-violet rays from a mercury vapour lamp at a distance of 90 to 100 centimetres. The light treatment is given at intervals of three days, and on each occasion the time of exposure to the ultra-violet rays is slightly lengthened. No other treatment is given. The suggestion is also made by this writer that in the future this disease should be called Swift's disease, after the name of the Australian physician who first described it.

A paper to which we hope to refer in our next issue is one On the Relationship of Throat Infection to Acute Rheumatism in Childhood, by Bernard Schlesinger, of the Children's Heart Hospital in West Wickham. A paper On the Value of the Different Therapeutic Agents in the Treatment of Rickets, and one on the Immunology of Scarlet Fever, with report of an unusual case, complete the number. The issue is a very interesting one, and the format of the journal all that could be desired.

A. D. B.

British Spelling of English as the Canadian National Standard

The *Journal* has received a modest booklet of sixteen pages, having the above title, which is published by the Canadian Geographical Society for the not prohibitive price of fifteen cents. It contains matter of an importance quite out of proportion to its humble appearance, and will repay perusal by all those who have occasion to spell. The author is the Managing Editor of *The Canadian Geographical Journal*, Mr. Kennedy Crone.

That some standard for the spelling of English is desirable and even necessary will be admitted by all thinking people. If we ask what that standard should be we would probably receive as many answers as there were persons to whom the query was put. A Canadian standard has been advocated by some, but Mr. Crone makes it plain that there is not and, indeed, cannot be any such thing. The practice of spelling in Canada is conditioned largely by tradition, taste, culture, prejudice, learning and locality. Undoubtedly, it is tinctured by American influence, owing to the flood of American periodicals, books, motion pictures, and syndicated newspaper matter that pours into our country. In spite of this, it is safe to say that British forms are also extensively used. An admixture, however, of British and American styles can never make a worthy Canadian style. At the present time, while our newspapers largely make use of Americanized forms they do not do so consistently, and the better-class magazines, among which we are pleased to include the *Canadian Geographical Journal*, conform largely to the British standard. That there is no accepted Canadian standard is proved by the fact that variations in spelling appear in different journals and on different pages, not to say on the same page, of the same journal. In passing, Mr. Crone refers to the sad case of a linotype operator in a certain publishing house who, in order to cater to the personal preferences of four customers, had to use on his machine four

standards of spelling in one day. Neither is there a consistent American standard, for tastes differ in the United States as well as in Canada, and it is a significant fact that several of their foremost "quality" magazines are adhering to the British Standard. An eminent American writer stated to the editor of the *Canadian Medical Association Journal* that he preferred to publish a certain address of his in our magazine rather than in an American one for the reason that he preferred the style and spelling practice of the Canadian journal. That practice is the British practice, also adopted by our contemporary *The Canadian Geographical Journal*, and based on the ruling of the Oxford English Dictionary.

It is true that English is in many ways inconsistent, and a coach-and-six may be driven through it at any time, as a certain legislator in England once remarked about an act of parliament, and this, no doubt, accounts for the consistent inconsistencies in spelling that are found in the different English-speaking countries. It is evident that there can be improvement, if we will. Mr. Crone makes a strong plea for the adoption of the British standard in Canada, and in this we concur. There are more arguments in favour of this practice than there are against it. The British standard is generally uniform; it is the declared official standard of the Dominion Government, and, with minor modifications, of the provincial governments; it is taught to most Canadian school-children; it is the standard of most of the Canadian universities and colleges. Besides all this, Mr. Crone points out that there are many organizations in commercial and social life that use only the British standard, including a number of important ones that require adherence to that standard. Mr. Crone concludes his plea with the statement that "the British standard is no less Canadian because it is British, and is no more geographically English, Scottish, or Australian than it is Canadian." The ideal would of course be, that, inasmuch as the English language transcends the bounds of countries, continents and allegiances, and is a noble heritage which all Anglo-Saxon peoples can claim in common, it might be reduced to order by common consent. But, perhaps, this is too much to expect.

A. G. N.

The Canadian Medical Protective Association

The Twenty-ninth Annual Report of the Canadian Medical Protective Association lies before us. It is interesting to note that the meeting at which this report was read was held in Winnipeg last August, in the city where the organization was founded twenty-nine years ago. During that period the Association has grown in strength and usefulness and has amply justified the wisdom and foresight of its originators. The last year has been a busy and anxious one, for some twenty cases have called for the intervention of the Association. About half of these are new cases; some have been settled and some are unsettled, but it is a matter for gratification that so far no judgment has been given against the Association. The General Counsel, Mr. F. H. Chrysler, K.C., in his report, calls attention to an anomaly which undoubtedly calls for rectification. In most of the provinces there is a time limit of two years, during which actions for malpractice must be entered, if at all. It is said that in Nova Scotia no time limit is specified. This is not as it should be. The memory of wrongs, or fancied wrongs, lives long, but the memory of relative and convincing detail is transitory. It is quite likely that where actions for malpractice are instituted several years after the commission of the acts brought under review, it may be impossible to get at the truth, owing to imperfect recollection of the facts, or, possibly, owing to the death or removal of material witnesses. Injustice may, therefore, be done.

The Canadian Medical Protective Association has been in existence for nearly thirty useful years; it is in a healthy financial condition. It should hardly be necessary to remind the medical profession that it is an institution which they would do well to join.

A. G. N.

The Present Status of Physiotherapy

The Canadian Radiological Society, which is now a regularly constituted Section of the Canadian Medical Association, is to be congratulated on its initiative in obtaining a series of articles, written by experts, dealing with the application of physics to the treatment of disease. It is intended to publish these monthly in the *Journal*, and such topics as the x-ray, radium, ultra-violet and infra-red rays, diathermy, galvanism, Faradism, sinusoidal currents, hydrotherapy and massage will be considered. The various subjects are to be dealt with in a way that will, it is hoped, be helpful to the general practitioner and to the man who is thrown, perforce, on his own resources in the matter of physiotherapy.

The first article of the series appears in this issue, and is entitled "The Historical Background of Physiotherapy." The second will treat of "The Present Status of Physiotherapy," and the third will be on "The Physics of the X-ray and Radium." These papers, introductory in character and general in scope, will be followed by others dealing more specifically with technique and therapeutic applications. Many of the articles will be accompanied by comments from various authorities, so that each topic will constitute a veritable symposium,

comprehensive and up-to-date. We have every confidence that these articles will prove valuable and will add to the attractiveness of our *Journal*.

A. G. N.

The Late Professor Teacher

Those who had the privilege of knowing Professor Teacher and appreciating his kindly personality will be distressed to learn of his death, which occurred on November 21, 1930. During his visit to Winnipeg last August, where he read a paper on "The physiology and pathology of the endometrium," Professor Teacher made many Canadian friends.

John Hammond Teacher was born near Glasgow in 1869 and was a graduate in Arts and Medicine of Glasgow University. At first he took up the study of physiology under the late Professor McKendrick, but soon gave this up in favour of pathology, which proved a superior attraction, particularly gynæcological pathology, in which study he gained outstanding distinction. One of his important tasks at this early date was the classifying and cataloguing of the anatomical and pathological material left by William Hunter, found in the Hunterian Museum. About this time, too, he became pathologist to the Sick Children's Hospital and assistant pathologist to the Western Infirmary. Based on his researches in gynæcological pathology, conducted at Glasgow and Vienna, Teacher produced his thesis for M.D., on the subject of chorionepithelioma, which gained him Honours and the Bellahouston Gold Medal for special excellence. He soon gained fame as the discoverer of the earliest complete fertilized human ovum known. This is known as the Teacher-Bryce ovum No. I., and his description of this is now a classic. In 1907 Dr. Teacher was appointed Lecturer in Pathological Histology, under Professor Muir, and in 1909 Professor of Pathology at St. Mungo's College, Glasgow Royal Infirmary. Two years later, when the new university chairs were founded in the Glasgow Royal Infirmary, he became the first Professor of Pathology, which position he occupied with distinction until his death.

Besides organizing his department Professor Teacher spent much energy in organizing a pathological museum in his department and in preparing a complete catalogue. In 1924 a second early ovum (Teacher-Bryce ovum No. 2) was discovered and described. For nearly thirty years Professor Teacher had collected and analyzed gynæcological material and it had been his intention to publish his conclusions in the form of a book within the next year. We are glad to learn that, despite his untimely death, this project will still be carried out.

Professor Teacher's reputation will survive as that of an exceptionally painstaking pathological histologist, with great command of technique, and good judgment in the interpretation of histological preparations. His researches into gynæcological pathology proclaim him a master in his special line. His conclusions will always be received with great respect.

Professor Teacher's hobby was yachting, and on his way to Winnipeg last August he diverted his course to New York, in order to indulge in his favourite sport. He was also a friend to athletics in all forms.

In summing up an appreciation of his late friend and colleague, Professor Muir has this to say of Teacher's personality, "A man of sterling character and generous nature, upright in all his dealings, and full of kindliness, with no small fund of humour, he was held in high esteem and affection, alike by his students and his colleagues."

A. G. N.

Our Correspondent in Ireland

We are pleased to announce that Richard H. Hunter, M.D., M.Ch., Ph.D., Professor of Anatomy in the University of Belfast, has been appointed our special correspondent for Ireland. Professor Hunter has had much experience in this kind of work, being already correspondent of the *Medical Press and Circular* and is a ready writer, well posted on medical affairs. He will report news of medical interest from both Northern Ireland and the Irish Free State, his letters appearing quarterly.

A. G. N.

DEVELOPMENTS IN THE PROBLEM OF ARTHRITIS.—In his review of this subject, Ralph Pemberton stresses the fact that attacking this problem with any drug or any vaccine alone is too often like firing at the head above the ramparts instead of at the fortification itself. In the opinion of most of the American committee for the control of this disease, it is of the first importance to envisage the disease as a whole, instead of focusing on any factor, be it mechanical, bacteriological or nutritional, which may merely precipitate it. In arthritis a variety of factors contributes to bring about the disease. No agency or organism is recognized by the American Committee for the Control of Rheumatism as the single cause of it, and no drug, vaccine or any single form of therapy can alter the hereditary or constitutional make-up, the faulty anatomy or physiology of the intestinal tract or the deranged metabolism secondary to the disease, perhaps sometimes underlying it. There is probably no other consideration before the medical profession more important in terms of persons now living than that of seeing this problem whole. Even irregular practitioners are now beginning to treat these sufferers with a breadth of view which some of the leaders of medicine do not entertain.—*J. Am. M. Ass.*, Jan. 3, 1931, **96**.

Special Articles

THE SURGERY OF THE SYMPATHETIC NERVOUS SYSTEM*

BY D. F. FRASER-HARRIS, M.D., D.Sc., B.Sc. (Lond.), F.R.S.E.

London

Possibly no part of the animal body has for a longer time been less understood than the sympathetic system of nerves and nerve-ganglia.

The name "sympathetic" was given to such nerve-fibres as were obviously not cerebrospinal in position by the Danish anatomist J. B. Winslow in 1732. About the year 1800, the French physiologist Bichât suggested the name "vegetative" for this system, desiring to contrast its functions of innervating organs outside the realm of conscious activity with those of the cerebrospinal nerves which seemed to promote voluntary action. These names were more accurate in a functional than an anatomical sense. In course of time, "the sympathetic system" came to mean all nerve-fibres which to the naked eye are not cranial or spinal in origin; and further the incorrect implication was made that the two sets of fibres—cerebrospinal and sympathetic—were anatomically independent.

Nothing was done for nearly eighty years, when Langley and Dickinson at Cambridge, in a long series of papers (1889-1899), showed that the sympathetic system was merely the peripherally distributing mechanism of the cerebrospinal system, the functional distribution being to almost every kind of tissue except striated muscle. On the afferent side, it is clear that the nerves of the special senses do not travel in the "sympathetic" system. Langley brought order out of chaos. Adopting the "neuron" hypothesis, he discovered that nicotine would block impulses at synapses, and he classified the different outflows of fibres from the cerebrospinal into the sympathetic system which he re-named "autonomic". We then had the following scheme:—

1. Autonomic fibres of cranial origin;
2. Autonomic fibres of sacral origin (together constituting the "para-sympathetic" system).
3. Autonomic fibres of thoracico-lumbar (dorsal) origin—the "sympathetic system" proper.

About the same time, Gaskell, also at Cambridge, introduced the conception of a functional neural segment including the two roots of the spinal nerve, the white ramus communicans, the grey ramus communicans and the related paths of efferent and afferent autonomic fibres. The white ramus was then seen to be the functional path of outgoing impulses from the spinal nerve into the sympathetic chain of ganglia; and the grey ramus the path of impulses from the synapses in the ganglia of the sympathetic chain out to the spinal nerves. But the Cambridge workers showed that, whereas there might be grey rami running into any of the spinal nerves, there were white rami out of only the nerves included between the second dorsal (thoracic) and the second or third lumbar segments. For short, this was called the "dorsal outflow". In a word, the sympathetic (autonomic) system is that arrangement of nerve-fibres which have taken origin in the cerebrospinal axis and are being distributed to all the viscera and heart as well as to blood-vessels, sweat-glands, hair-muscles, intrinsic eye-muscles and the salivary glands. The sympathetic system is neither anatomically nor physiologically separate from the cerebrospinal.

The first suggestion to operate on the sympathetic system was made in 1899 by François-Franck[1]. This procedure was recommended for angina pectoris, but it was not until seventeen years later that Jonnesco[2] actually performed the first operation of "sympathectomy"*. The sympathetic chain has been cut, or certain of its rami severed, for all the following conditions—epilepsy, migraine, trigeminal neuralgia, exophthalmic goitre, angina pectoris, asthma, cardiospasm, pylorospasm, duodenal ulcer, congenital megacolon (Hirschsprung's disease), Raynaud's disease, thrombo-angiitis obliterans, senile gangrene, trophic ulcers, indolent and chronic ulcers, delayed and non-union of fractures, erythromelalgia, scleroderma and spastic paralysis.

ANGINA PECTORIS

As a concrete example of successful sympathectomy we may take first the case of the surgical relief of angina pectoris.

Before considering the operation itself, we must remind ourselves of the physiological anatomy of the cardiac nerves. These are, of course, all of autonomic (sympathetic) nature, and amongst them the vagus is included (cranial parasympathetic). The sympathetic efferent cardiac fibres are cardio-accelerator and cardio-augmentor in function†. Their post-ganglionic fibres have come from synapses in all of the following ganglia—superior, middle and inferior cervical

* In the preparation of this paper I have to acknowledge my indebtedness to the work by Prof. Albert Kuntz, "The Autonomic System," 1929.

* By "sympathetic ganglionectomy" is understood the removal of a ganglion in order to interrupt all its peripheral connections. "Sympathetic ramisection" consists in the cutting of all rami passing between a spinal nerve and the related ganglion of the sympathetic chain.

† Whether they are also vaso-constrictor to the coronary arterioles is still undecided.

and 1st to 5th thoracic inclusive. (Anatomically, the inferior cervical ganglion and the 1st thoracic are usually fused to form the "ganglion stellatum".) These fibres, which are known to anatomists as the superior, middle and inferior cardiac nerves, arise in the corresponding cervical ganglia, and the thoracic cardiac nerves arise in the ganglion stellatum, and, with the exception of the superior cardiac nerves, they all end in the deep cardiac plexus. The superior cardiac nerves end in the superficial cardiac plexus. It will be remembered that the pre-ganglionic accelerator fibres leave the cord only by the white rami leading to the 1st to 5th sympathetic thoracic ganglia inclusive.

The afferent cardiac fibres are believed to travel both in the sympathetic and in the vagus. They constitute the afferent limbs of two (visceral) reflex mechanisms—the depressor reflex (of Marey) and the pressor reflex (of Bainbridge). They also convey painful impressions which it is the object of sympathectomy to cut off. The physiologists and the surgeons are not agreed on the details of the paths of entry of the cardiac afferent fibres into the posterior roots of the spinal nerves.

That reflexes and referred pains occur during an attack of angina pectoris is certain. Whereas Allbutt thought the depressor reflex with cardio-inhibition and a fall of blood-pressure predominated in angina pectoris, Danielopolu, of Bucharest, believes the pressor reflex is prepotent.

As mentioned above, François-Franck[1] suggested resection of the cervical sympathetic chain along with some part of the thoracic for the relief of angina pectoris which he regarded as a cardio-aortic neuralgia. Jonnesco, in 1916, actually performed the first sympathectomy for angina pectoris by removing the middle and inferior cervical ganglia and the first thoracic ganglion on the left side, with such encouraging results that he did not find it necessary to operate on the right also. In his later operations, Jonnesco removed the superior cervical ganglion as well. As this was thought to be too drastic a procedure, it was not followed up in Europe or America. Jonnesco[2], however, six years later published a full account of his operation, having in the meanwhile found no danger in the bilateral operation. We may now follow the account Danielopolu[3] gives of these things, as he has studied the problem with very great care.

Danielopolu believes that all the cardio-aortic afferent sympathetic fibres pass first to the stellate ganglion, whence one set ascends as far as the superior cervical ganglion, and that these fibres leave the cervical chain as "rami" for the 1st to 4th cervical nerves inclusive. This is the path for the reflex spasms of face and jaw muscles which may occur in angina pectoris. The other or lateral set of fibres, he says, passes backwards in the thoracic chain and leaves it in the rami of the 8th cervical and first four thoracic spinal nerves. These are the afferent fibres for the familiar referred pain in the left arm.*

Danielopolu believing that, as regards pain, the fibres of the ascending group are the more important, cuts the cervical chain just above the stellate ganglion, which he leaves intact on account of the important efferent fibres passing through it; he leaves the vagus alone.

A very thorough account of the surgery of angina pectoris was given by Reid and Andrus,[4] of Cincinnati, in 1925, with a bibliography of no fewer than 56 papers. These authors first of all point out that a good many cases of what is called angina pectoris should be regarded as cardiac neuralgia. Fortunately these cases are benefited by the same surgical treatment as are those of true angina pectoris. In this disease, Allbutt thought the cause of death was reflex cardio-inhibition. Reid and Andrus regard that type of heart as the most favourable for operation which is without severe organic lesion and myocardial insufficiency. These surgeons have no single type of operative interference with the sympathetic chain; they cut it or its rami at various levels; they are even not averse to removing the stellate ganglion itself; indeed out of 16 successful cases, 6 had the stellate ganglion removed.

Reid and Andrus report on 62 cases of sympathectomy for angina pectoris. In 50 of these various kinds of sympathectomy had been done; in 12 the depressor nerve was cut as well. In 7 cases out of the 62, the operation was done on both sides. Of the 50 cases just referred to, 16 had been "most strikingly benefited" for periods ranging from 3 months to 7 years. Of 15 unsuccessful cases, 10 died within one month, one after six weeks, one after eight months, and three died from post-operational shock.

Section of the sympathetic chain or of rami (ramectomy) is not the only method of interrupting the afferent cardiac fibres. Some surgeons practise avulsion of the ganglia, and others inject various substances, without severing any fibres.

In 1927 Elliott C. Cutler,[5] of Cleveland, Ohio, published a critical study of 120 cases of operation for angina pectoris.

He divided the cases into five groups as follows:

1. Twenty-seven cases operated on by Jonnesco's method, 18 unilateral and 9 bilateral; of these 62 per cent lived long enough to say they had been distinctly benefited, and 18.5 per cent long enough to say their condition had improved.

2. Fifty-three cases of "cervical sym-

* The exact course of *afferent* autonomic fibres is not known with certainty. As medullated fibres, they are supposed to enter the white ramus and reach the ganglion on the posterior root of the spinal nerve in which is their trophic cell. Recent research has suggested that not all autonomic afferent neurons are medullated; these non-medullated fibres may be those which have been found in some white rami.

pathectomy", *i.e.*, a less extensive operation than Jonnesco's: the results were—41.5 per cent good; 35.8 per cent improved; 11.2 per cent not relieved.

Taking groups 1 and 2 together, Cutler comes to the conclusion that 80 per cent of the cases were "relieved", and he is of the opinion that the results from the "complete Jonnesco procedure" are better than those from simpler operations.

3. Twelve operations on the "depressor" nerve: 9 cases good; and 2 not relieved.

4. Two cases in which there was cervical sympathectomy and as well as section of the depressor, both of which were relieved.

5. Twenty-six operations, described as "posterior root procedures", in all of which the improvement was "doubtful".

Cutler thinks that the success of Jonnesco's "total procedure" is because in it the motor fibres for certain cardiac reflexes are severed. One of the reflexes he refers to is coronary vasoconstriction, which, by causing cardiac anæmia, leads to spasm of the cardiac muscle. He considers that Danielopolu has not proved that Jonnesco's procedure is too extensive. Some of Jonnesco's early fatalities were probably due to the fact that the myocardium itself was in an unsuitable condition for operation. Cutler further believes that any advantage from cutting the depressor nerve may be that the afferent fibres for a cardiac reflex are severed, even although the depressor may not carry sensory fibres. But it is a nerve difficult to identify in man, in whom it has not the same anatomical disposition as in the dog. Certainly the anatomical type in the rabbit is not that of man.

As early as 1923, Danielopolu himself injected novocain into the posterior roots of the 1st and 2nd dorsal nerves, and found that anginal pain was abolished for five to six hours. In another case of this injection, the pain did not return even although the patient engaged in strenuous muscular exercise. But J. C. White[6] injects alcohol into the rami belonging to the 8th cervical and upper seven thoracic nerves, believing, in opposition to Danielopolu, that the chief afferent cardiac fibres are passing centralwards in these strands. There is also no agreement among the surgeons as regards the kind of anæsthesia for sympathectomy.

Jonnesco, the pioneer in this work, operates under high spinal anæsthesia, while Ransohoff[7], who follows Jonnesco's operational technique, prefers local infiltration anæsthesia with 0.1 per cent novocain. Ransohoff lays a great deal of stress on preventing even the slightest amount of hæmorrhage, for once the tissues become blood-stained the landmarks are gone. This method White calls, "the paravertebral block method" and claims that he has abolished the pain of angina pectoris in 21 cases so treated. By the same procedure G. I. Smetlow[8] has relieved 18 out of 22 cases. White mentions "recently discovered nerves which run directly across the mediastinum from the posterior cardiac plexus to the upper dorsal sympathetic ganglia". He believes that some afferent fibres travel by these.

Two French workers, Delherm and Bean[9] have quite recently published a paper dealing with the beneficial results of the use of x-rays in angina pectoris. They believe that the x-rays "modify the tonus" of the sympathetic system. They attribute angina pectoris to a "hyperexcitability of the cardiac plexus". Surely in this case the x-rays must depress the tone.

So recently as the present year, Danielopolu[10] records 28 cases of angina pectoris in patients aged from 24 to 64 years who had been treated in France, Italy, Austria, Roumania and America by sympathectomy. The operation was to cut "all the vertical branches of the vagus, the rami communicantes of the inferior cervical and first thoracic ganglion, with 6th, 7th and 8th cervical and first dorsal nerves, along with section of the vertebral nerve*. and the nerves anastomotic between superior laryngeal nerve and vagus." Danielopolu still thinks it advisable to leave the stellate ganglion intact. "These nerves (cut as described) do not contain any fibres the section of which is dangerous", but they carry a sufficient number of afferent cardio-aortic fibres which must be severed to abolish pain and the "pressor" cardiac reflex. In the large majority of the cases the relief of pain was complete. In those cases where pain was not wholly abolished, the operation had not been complete. The avoidance of any fatalities is attributed to the fact that care was taken to avoid cutting important nerves, such as the inferior cardiac, and the rami between the stellate ganglion and the 2nd to 4th dorsal nerves inclusive.

DISEASES OF THE ABDOMINAL VISCERA

Most of the operating on the abdominal sympathetic has been to relieve spastic conditions at the pylorus, the ileocolic sphincter, or the pelvi-rectal sphincter.

We may first say a few words about the behaviour of the muscle of the alimentary canal. Physiologists now believe, since the experiments of Gunn and Underhill[11] in 1914, that all the muscle of the alimentary canal—longitudinal, circular and the muscularis mucosæ—possesses an inherent rhythmicality apart from all innervation, extrinsic or intrinsic. Thus, it is doubted whether the presence of Auerbach's plexus is absolutely necessary for peristalsis, as was held by Bayliss and Starling[12]. These purely myogenic movements can be augmented by pilocarpine and barium chloride, and inhibited by atropine and adrenalin. While this is so, the opening and closing of the pylorus (hydrochloric acid reflex) is brought about through the instrumentality of the intrinsic plexuses. Thus,

* This is a branch from the superior cervical ganglion to the vertebral artery.

the reflex closure of the pylorus from free hydrochloric acid in the duodenum is abolished after a number of cuts have been made in the plexuses. This must therefore be regarded as a "local" reflex from Meissner's plexus. But, as is well known, the alimentary canal, both as regards peristalsis and secretion, can be profoundly influenced by stimuli arising in other visceral regions or in the skin itself. These are the long, typical, visceral reflexes mediated by the extrinsic nerves. Hence, as Woollard says: "afferent impulses from almost any part of the body may affect the secretion and movements of the alimentary canal." The troublesome reflex inhibitions due to injury and surgical trauma are specific examples of the last mentioned.

The innervation of the alimentary canal may be summarized thus. The sympathetic nerves maintain the tonic closure of the sphincters, but the inhibition of all the other muscle, while the parasympathetic nerves (vagus and sacral) induce inhibition of the sphincters and the increase of tone of all the other muscle.

Fraser[13] has classified the abnormalities of abdominal innervation as follows:—

1. There may be spasm of the sphincter muscle due to augmented intensity of innervation. This, being long continued, leads to a state known as "achalasia", in which the sphincter refuses to relax.
2. There may be such predominance of inhibition that a state of chronic atony is induced.
3. There may be conditions of irregular peristalsis.

Operations involving sympathectomy have been chiefly for the relief of—

1. Hypertrophic pyloric stenosis;
2. Congenital dilatation of the ileum due to spasm of the ileo-colic sphincter; and
3. Congenital dilatation with hypertrophy of the colon from spasm of the pelvi-rectal sphincter, a condition known as "Hirschsprung's disease".

The other autonomic nerves directly involved in the innervation of the pelvic organs are the "pelvic splanchnics" or "visceral" branches of the 2nd, 3rd and 4th secral nerves. These are the parasympathetic pelvic fibres. They enter the pelvic plexus directly, *i.e.*, without having any synapses in the sympathetic trunk. Their function is—

1. Motor, to the longitudinal muscle of the rectum;
2. Inhibitory to the sphincter ani;
3. Motor to bladder;
4. Motor to uterus;
5. Vaso-dilator to arterioles of penis; and
6. Secretory to the prostate gland.

By far the greater number of operations on the abdominal sympathetic have been for the relief of Hirschsprung's disease What is aimed at is interruption of the impulses travelling in the lumbar sympathetic nerves, since these are motor or tonic to the pelvi-rectal sphincter and inhibitory of the rest of the colonic muscle. The exact opposite of this is desired, namely, relaxation of the sphincter and increase of peristalsis of the colonic muscle. The operation, as done by Wade and Royle[14] in 1927, may be thus described.

The case was a boy of ten years old with congenital megacolon. The procedure was that of left lumbar sympathetic rami-section, for the white ramus to the 1st lumbar ganglion was cut, as also all fibres crossing over from the left to the 1st to the 4th lumbar ganglia (inclusive) on the right, and the sympathetic trunk itself was divided below the 4th lumbar ganglion. Improvement was progressive up to five months, when the bowel emptied itself without the aid, as previously, of enemata. Later, Wade operated as just described on four cases of megacolon with two results quite satisfactory and two not so.

In 1928 Judd and Adson[15] operated on two cases of megacolon. In the former of these, a boy of two years old, the second to the fourth lumbar ganglia (inclusive) were removed with the intervening portions of the trunk. The result was good. In the second, a boy of six years, the 2nd to 4th lumbar ganglia on both sides were removed with entirely satisfactory results.

These procedures leave the rectum under the control of the pelvic splanchnics whose inhibitory activity is of the kind required in "megacolon". Judd and Adson remark that the lesion in megacolon may be (1) irritation of post-ganglionic fibres, or (2) of pre-ganglionic fibres, or (3) central in position. The last suggestion is the one to which they themselves incline.

The latest contribution to the subject of "megacolon" is by R. B. Wade[16] in the present year. He reports on 13 cases in children relieved by sympathetic lumbar ramisection. In almost every instance, normal defaecation was restored by the time the child was convalescent from the wound. The abdominal distension of the colon decreased and the general health of the children improved.

VISCERAL PAIN

Recently, various forms of sympathectomy have been carried out for the relief of persistent, incurable pain in the abdomen or pelvis.

Thus Bittmann[17], in 1926, operating on nine gynaecological cases, and desiring to interrupt afferent impulses in the aortic plexus, removed the inferior mesenteric ganglion and all nerve networks on the abdominal aorta for from 8 to 12 cm. and on the common iliac arteries for 4 cm. These procedures were quite successful in the relief of the pain.

In 1928 Pieri[18] did ramisection in 34 cases for abdominal pain. The organs which were affected included the stomach, intestine, bile-ducts, pancreas, kidney, testis, bladder and uterus. Pieri cut only those rami concerned in conducting impulses from the viscus in question. It has been repeatedly found that in order to remove abdominal pain it is necessary to cut the nerves only on one side. Thus for certain kinds of

gastric pain, only the rami on the right side need be cut.

For "gastric crises", Bardon and Leuret[19] cut the rami of the 9th, 10th and 11th thoracic nerves, giving complete relief. To remove the pain in the gastric crises of tabes, in renal neuralgia, and in severe pelvic neuralgia, Barnard and Theodoresco[20] have cut the pelvic sympathetic nerves with satisfactory results. In 8 cases of inoperable advanced painful pelvic carcinoma, they have done this operation, and given complete relief in some cases and partial relief in the others.

ASTHMA

There seems no doubt that a good many cases of asthma have been benefited by cervical sympathectomy, although the benefit was not permanent in all of these.

For instance, Kümmell[21] reported on 17 cases, in 13 of which the superior, middle and inferior cervical ganglia were removed on one side and in the remaining 4 on both sides. In all except one case the asthma ceased at once, but in 3 cases the attacks recurred after 3, 6 and 16 weeks, respectively. Kümmell advocates the operation, but the experiences of some other surgeons have not been nearly so satisfactory. Thus M. A. Ramirez and E. H. Pool[22] in 1925 had two complete failures in which they excised the entire cervical sympathetic chain on the right side. Böttner[23] in the same year resected the entire cervical chain on one side in 3 cases, all of which were failures. Hesse[24] in 1927 had 17 cases of cervical sympathectomy, 12 unilateral and 5 bilateral, less than 30 per cent of which could be called satisfactory.

The discordant results of these operations may be due to several conditions, not all of which are within the control of the surgeon. The innervation of the bronchial tubes is possibly not even yet wholly understood. The usual statement is that stimulation of the vagus leads to broncho-constriction, of the sympathetic to broncho-dilatation. At the same time one must remember, as Dixon and Ransom[25] showed in 1912, that sometimes powerful vagal stimulation is followed by relaxation of the circular bronchial muscle, and powerful stimulation of the sympathetic by spasm of it. Kümmell,[26] writing in 1926, put forward the opinion that some fibres of vagal origin travelled in the sympathetic nerves, that is, fibres physiologically broncho-motor might be stimulated in the sympathetic, and if prepotent, which they easily might be, would cause constriction when the sympathetic was stimulated even reflexly. Clearly, then, cutting the sympathetic supply to the bronchi, if it contained physiological broncho-constrictors, would be helpful in cases of asthma. Indeed the reflex nature of asthma is very evident. As is well known, an attack of asthma may be precipitated if, there being some bronchitis, a spasm of the circular bronchial muscle is brought about reflexly from the skin, nasal passages, stomach or heart. In such cases the bronchial vagus would be, in Sherrington's language, the "final common path". Thus Braeucker and Kümmell Jr.[27] showed, in 1927, that stimulation of the central end of the cut sympathetic, the stimulation of the central end of one cut vagus, and the stimulation of the medulla oblongata did not produce bronchial spasm after the bronchial branches of the other vagus were cut. Reflex asthmas may, however, be of several types, and the type in which the source of the afferent irritation may be in the bronchial or pulmonary mucosa must be borne in mind. It may quite well be that the autonomic respiratory afferent neurons are in the sympathetic system, and that therefore the section of these, by removing the afferent irritation and interrupting the reflexigenous impulses, abolishes the muscular spasm otherwise reflexly produced. Cases not benefited by this operation may not have been based upon the internal reflex just described.

Cutting afferent paths of a reflex is just as efficacious, physiologically, in abolishing the reflex as is cutting the motor paths. Cases of benefit in asthma after cervical sympathectomy may be explained in this manner. The good results in asthma derived from unilateral sympathectomy may be explained on the assumption that afferent fibres from both lungs pass into the sympathetic of each side on their way into the central nervous system.

SYMPATHECTOMY IN HYPERHIDROSIS

In the distressing condition of excessive sweating of the hands and feet, sympathectomy or the appropriate ramisectomy has given relief, seeing that the sudo-motor fibres are "sympathetic".

In 1928 Braeucker[28] treated the case of a young woman suffering from excessive perspiration on hands and feet. Braeucker first of all cut the rami of the 8th cervical and the 1st thoracic nerve on the left side, and at once the left arm and hand became free from sweating. Encouraged by this result, he proceeded to perform ramisectomy on both sides at level of 4th and 5th lumbar and the first sacral ganglia. Both legs and feet became perfectly dry, thus, in the end, only the right hand remained damp.

RAYNAUD'S DISEASE AND SPASTIC PARALYSIS

Raynaud's disease is regarded as permanent vaso-constriction due to some hypertonic condition of the autonomic neurons concerned with maintaining vascular tone. It is a condition of permanent vaso-spasm. The operation devised by N. D. Royle,[29] of Sydney, N.S.W., is the one best known for both the diseases just mentioned. He calls it "trunk section". Royle's object is to divide the post-ganglionic vaso-constrictor neurons going via the 1st thoracic nerve to the arm. By transecting the sympathetic trunk below the 1st thoracic ganglion he divides the maximum number of fibres to the arm but the minimum number to the eye.

In this way "Horner's syndrome will not usually appear". Royle makes his incision

"across the insertion of the sterno-mastoid into the clavicle"; when the first thoracic nerve is seen, "if the palmar surface of the finger is placed on the 1st thoracic nerve, the nail will lie against the sympathetic trunk as it crosses the neck of the first rib." We have used the word "transection", but as a matter of fact Royle prefers to hook up the trunk on a strabismus-hook in which position it "may be avulsed in sections with another hook". Royle does not find the heart-rate affected even by transection on both sides of the body. The results of this operation for the relief of Raynaud's disease are striking; a hand that was previously blue and cold becomes almost at once pink and warm and remains so.

The technique of Royle's operation for spastic paralysis is the same as for Raynaud's disease, but the physiological principles on which it is based are in dispute. The differences of opinion concern the so-called "double innervation" of striated muscle, the view that the sympathetic system contributes some of the innervation of striated muscle in the direction of maintaining its tone. Woollard[30] classifies the conflicting views conveniently thus:—

1. That no sympathetic fibres go to striated muscle (Spanish school of histologists);
2. Only ocular muscles are doubly innervated (Bielschowsky);
3. All striated muscles are doubly innervated (Boeke).

The evidence for or against these views is largely histological, Boeke thinking that each muscle-fibre has the two kinds of nerve-endings, Kulchitsky believing that there are two kinds of muscle-fibre, one innervated by cerebro-spinal nerves, the other by sympathetic.

Woollard, whose paper is excellently critical, gives references to 28 papers. He himself has worked at the problem, and he remarks that the double innervation of striated muscle does not rest on a secure basis. Although this uncertainty exists, Woollard admits frankly that Royle's operation—"ramisection for hypertonus"—is a great success.

Kuntz[31] in his text-book (1929) devotes a long chapter to the subject of the double innervation of striated muscle, and comes to the conclusion that this is not demonstrated by anatomical methods. He says that in 1915, Langelaan advanced the view that the contractile component of muscle which carried movement was innervated by cerebrospinal fibres, while the plastic component responsible for the maintenance of posture was innervated by the sympathetic. Kuntz, who has himself experimented on dogs, comes to the following conclusions:—"that the resistance of an extensor muscle to passive extension is diminished following deprivation of its sympathetic nerve-supply, and that an extensor muscle deprived of its special nerve-supply, but with its sympathetic innervation intact, still offers greater resistance to passive extension than the completely denervated muscle." But the relative importance of the factor of sympathetic tone is minimized by the statement that the loss of tone following cutting of the sympathetic fibres is completely compensated by the cerebro-spinal mechanisms.

So recently as November 22nd, 1930, the *Lancet* published a report on R. B. Wade's[14,32,33] latest operational treatment for spastic paralysis (35 cases): "ramisection plus tenotomy and re-education should be the operation of choice in cases of spastic paralysis. The automonic innervation of the heat-production in muscle is the subject of a paper by three Japanese workers[34] in *Quart. Jr. Exper. Phys.* (October, 1930). They used a thermo-electric method and studied the heat-production in the hind legs of frogs after denervation. The heat-production was diminished by the removal of the lumbar sympathetic chain and by the section of either of the roots of the spinal nerves. The removal of the lumbar sympathetic chain along with section of the dorsal roots abolished all heat-production. This was also brought about by the high transection of the cervical cord. These workers believe in the activity of a heat-regulating centre in the hypothalamus whence impulses pass to muscles by the sympathetic and parasympathetic tracts.

INADEQUATE PERIPHERAL CIRCULATION

Some surgeons have performed sympathectomy with the view of producing a hyperæmia which would predispose to a local curative increase of metabolism. Thus a case of obstinate polyarthritis in 1927 was virtually cured by Rowntree and Adson in the following manner. They first of all did a bilateral lumbar sympathectomy and ramisectomy in excising the 2nd, 3rd and 4th lumbar ganglia. Almost immediately, the cold and painful feet became warm and comfortable; and before the patient left hospital she could walk from 1½ to 2 miles. Encouraged by this result, they proceeded to bilateral extirpation of the inferior cervical and 1st and 2nd thoracic ganglia, with the result that the condition of the hands became as satisfactory as that of the feet. The surface temperature of the hands had been 9° C lower than that of the feet.

PERIARTERIAL SYMPATHECTOMY

The merits of the operation described as "periarterial sympathectomy", which is done for the relief of angio-spasm and depressed metabolism locally, are still being discussed. The reports are distinctly contradictory. The operation consists in stripping the nerves off a certain length of artery, in the belief that these contain the vasoconstrictors for the related arterioles. In some cases a curative hyperæmia and abolition of pain has thus been brought about, while in others it has not been so. The results are not sufficiently uniform to warrant this procedure as a routine practice.

The German worker Rieder[35] has found both by periarterial sympathectomy and by ramisection, that wounds in animals so operated on healed better than those in the controls.

REFERENCES

1. FRANÇOIS-FRANCK, *Bull. de l'Acad. de Méd.*, May 30, 1899.
2. JONNESCO, *Presse méd.*, 1922, **30:** 353.
   Ibid., Bull. de l'Acad. de Méd., 1921, **86:** 67.
   Ibid., Bull. de l'Acad. de. Méd., 1921, **86:** 208.
3. DANIELOPOLU, *Brit. M. J.*, 1924, **2:** 553.
   Ibid., Presse méd., 1926, **34:** 113.
   Ibid., Bull de l'Acad. de Méd., 1926, **96:** 153.
   Ibid., Zeitschr. f. klin. Med., 1928, **107:** 397.
4. REID AND ANDRUS, *Ann. Surg.*, 1925, **81:** 591. (References to 56 papers).
5. CUTLER, *Am. J. M. Sc.*, 1927, **173:** 613. (References to 58 papers).
   Ibid., Ann Clin. Med., 1927, **5:** 1005.
6. WHITE, *Am. J. Surg.*, 1930, **9:** 98.
7. RANSOHOFF, *Ann. Surg.*, 1925, **81:** 585.
8. SMETLOW, *Am. J. Surg.*, 1930, **9:** 88.
9. DELHERM AND BEAN, *J. de Radiol. et d'Electrol.*, July, 1930, 391 (abs. in *Brit. M. J.*, Oct. 18, 1930, **2:** 63.)
10. DANIELOPOLU, *Zeitschr. f. klin. Med.*, 1930, **113:** 294 (Abst. in *Brit. M. J.*, Nov. 8, 1930, Epitome, p. 74).
11. GUNN AND UNDERHILL, *Quart. J. Exper. Phys.*, 1914, **8:** 275.
12. BAYLISS AND STARLING, several papers in *J. Phys.*, 1899-1901.
13. FRASER, *Brit. M. J.*, 1926, **1:** 359.
14. WADE AND ROYLE, *Med. J. Australia*, 1927, **1:** 137.
15. JUDD AND ADSON, *Ann. Surg.*, 1928, **88:** 479.
16. WADE, *J. Coll. Surg. Australasia*, July, 1930, **3:** 3.
17. BITTMANN, *Lyon Chir.*, 1926, **22:** 757.
18. PIERI, *Arch. Ital. di Chir.*, 1928, **20:** 587.
19. BARDON AND LEURET, *Gaz. hebd. de Scien. méd. de Bordeaux*, 1928, **49:** 275.
20. BARNARD AND THEODORESCO, *J. de Chir.*, 1928, **31:** 340.
21. KÜMMELL, *Arch. f. klin. Chir.*, 1924, **133:** 593.
22. RAMIREZ AND POOL, *J. Am. M. Ass.*, 1925, **84:** 2002.
23. BÖTTNER, *Med. Klin.*, 1925, **21:** 197.
24. HESSE, *Deutsch. med. Wchnschr.*, 1927, **52:** 870.
25. DIXON AND RANSOM, *J. Physiol.*, 1912, **45:** 413.
26. KÜMMELL, *Arch. f. klin. Chir.*, 1926, **142:** 499.
27. BRAEUCKER AND KÜMMEL, JR., *Pflüger's Arch.*, 1927, **218:** 301.
28. BRAEUCKER, *Arch. f. klin. Chir.*, 1928, **149:** 718.
29. ROYLE, *Med. J. Australasia*, 1928, **2:** 436.
   Ibid., Brit. M. J., Oct. 18, 1930, **2:** 628.
30. WOOLLARD, *J. Coll. Surg. Australasia*, Nov., 1929, 185. (references to 28 papers).
31. KUNTZ, The Autonomic Nervous System, Baillière, Tyndall, and Cox, London, 1929.
32. ROWNTREE AND ADSON, *J. Am. M. Ass.*, 1927, **88:** 694.
33. WADE AND POATE, *J. Coll. Surg. Australasia*, March, 1930, (refers to work of H. LeRoy von Lockeim of the Orthopædic Dispensary and Hospital, N.Y.)
34. KURÉ, ARAKI AND MAEDA, *Quart. J. Exper. Phys.*, 1930, **20:** 201.
35. RIEDER, *Zentralbl. f. Chir.*, 1924, **51:** 1685.
   Ibid., Zeitsch. f. d. ges. exp. Med., 1927, **56:** 518.

Men and Books

SIR JOHN RICHARDSON*

SURGEON, PHYSICIAN, SAILOR, EXPLORER, NATURALIST, SCHOLAR

BY D. A. STEWART, B.A., M.D., LL.D.,

Medical Superintendent, Manitoba Sanatorium, Ninette, Man.

Surely here is a long full life of many enthusiasms that would have been after Osler's own heart. A ship surgeon fighting Napoleon, and on American duty in 1814, a physician also, a searcher after the North-West Passage in three expeditions, a naturalist, the first to write about the fauna and flora of the Arctic Circle, a hospital administrator and reformer, Richardson lived to know Carlyle, to interview Florence Nightingale, and to find a job abroad for a keen house-surgeon called Huxley. Brought up literally at the feet of Robert Burns, who spent Sunday evenings in his father's home and chose the boy's poetry, Richardson lived to share the hobbies of Archbishop Trench and Max Müller and to work out a study of the vocabulary of the "plowman poet".

John Richardson, the son of Gabriel Richardson, one time chief magistrate of Dumfries, and Anne Mundell, his wife, was born in Dumfries on November 5th, 1787, the eldest of an old-fashioned family of twelve children. His biographer, who belongs to the old school of hero worshipping and tagging of morals, and not to the new school of dissection and muckraking, quotes an old servant of Richardson's father as saying that "the Provost was a good friend to the poor and never known to speak unkindly to anyone," while his mother was a woman of "vigorous understanding and clear judgment, frugal, independent and generous." The moral is, of course, that we should be extremely careful in our choice of parents.

In the very proper fashion of the day, young Richardson learned to read at home, and afterwards, at the early age of four, was sent to school, which was not so proper. In these days, and in purposeful, strenuous Scotland, no time could be wasted in merely being a boy. At eight he went to the grammar school, and here, like Osler, met with a big man in a small sphere, James Gray, whose influence was life-long.

A VERY YOUNG SURGEON

Ours is not the only day of youthfulness in students of medicine. When two days short of his thirteenth birthday, that is, while still twelve years old, young Richardson began a three years'

*A paper read in the Section of Medical Sociology and History of Medicine at the combined meeting of the British and Canadian Medical Associations, Winnipeg, August 28th, 1930.

apprenticeship to his uncle, an eminent surgeon of Dumfries. On the death of this uncle he was sent to Edinburgh, when not yet fourteen, to begin the formal study of surgery, which included chemistry and Greek. When not yet seventeen, he and his family, with due Scotch caution, considered the pros and cons of a house surgeonship in the Dumfries and Galloway infirmary, and decided in favour. We are not surprised to learn that he was an earnest student and reliable interne, though doubtless he carved his name on the stout oak door of the infirmary, as the house surgeons had done for a century before him.

When not yet nineteen, but with already six years' experience, he returned to formal study at the University. Thrust thus prematurely into surgical studies and experience, the boy fortunately had a liking for nature and outdoor life, and delighted in long rambles in the country. A hobby was thus developed which was to become almost a vocation, certainly to shape his whole life.

In 1806 Napoleon was upsetting Europe and the British navy was diligently on the job. It became necessary for this mature young man of nineteen to consider both his country's need, and also the duty of the eldest in a family of twelve to get a job for himself. His examination for an assistant surgeonship in the navy "lasted only fifteen minutes and was quite easy." After a visit home he set off for London by the Glasgow Mail, travelled three days unrestingly and uncomfortably, but economically, and arrived in London, as would be expected, in low spirits. Here he met his old companion, Robert Burns junior, "began to speak English and walk straight," dined daily for a shilling on a plate of roast beef and a pint of ale, passed the examination of the Royal College of Surgeons of London, and was appointed, not yet twenty, assistant surgeon to 'La Nymphe' frigate. His ship mounted forty-four guns, sailed well, the officers were civil, the commander congenial, and, the young Scot wrote home, "We shall mess cheaply and comfortably." Note the order.

FIGHTING NAPOLEON

Off Portugal there were "cutting out" episodes —ships, of course, not tumours,—in which the young surgeon gave evidence of soldierly spirit as well as surgical skill. So, in the line of promotion, he became senior assistant surgeon in the flagship "Hibernia", acting surgeon of the "Hercules", seventy-four guns, and, later the same year, when not yet twenty-one, full surgeon to the "Blossom", sloop of war. He breakfasted at eight, visited the sick and wrote reports from nine to eleven, dined at two, visited the sick again at six, or saw them oftener, retired at ten, dined with the captain three times a week, entertained the captain on Sunday, and for the rest of the time walked the deck and read books, of which he had already acquired one hundred.

In 1812, at the age of twenty-four, came a leave of absence, mostly devoted to study in London, where with characteristic forethought he laid out twenty pounds in taking permanent tickets for surgical and anatomical lectures so that at any future time he might attend free of expense.

THE AMERICAN WAR OF 1812

In the bitter winter of 1812-13 the grand army of France perished amid the snows of Russia, and Napoleon came back to Paris almost alone. But, if France was quiet for a time, America was up in arms. The "Cruiser", with Surgeon Richardson, scoured the Northern seas for American privateers, was disabled, and paid off, and the young surgeon got some farther use of the twenty pounds London fees. In the summer of 1814 he was appointed to the First Battalion of Royal Marines, now in America, and, not liking service on the Great Lakes, marched and sailed with half the battalion from Montreal, greatly admiring Canadian trees by the way, for service along the coast of Georgia.

Richardson had no heart in this American service, thoroughly disliked the "predatory system of warfare which serves to degrade the British character without materially injuring the enemy," thought the British attack upon Washington, especially the burning of the public library, "barbarous", much worse than the conduct of half-civilized Russians in France, and was thoroughly uncomfortable about the seizing of the property of the unresisting settlers. Even so far south he had to deal with frostbites, and chilblains were the order of the day. Fortunately for the force, the two nations, and the world, peace was soon concluded, and shortly afterwards came the great general peace following Waterloo.

With peace came half pay, two years' farther study to add to his surgeonship the much superior status of physician, then marriage, and an attempt at practice in Leith. His graduation thesis, making use of his American experience, was *De Febre Flava*.

From the monotony of the beginnings of practice he escaped by applying for the position of Surgeon and Naturalist to the first Arctic expedition of Lieutenant, afterwards Sir John, Franklin. The report on his knowledge of natural history being satisfactory he was appointed, and made second in command of the expedition as well. It was his avocation, not his vocation, that brought him this appointment with its opportunities.

THE NORTH-WEST PASSAGE

Ever since Eric the Red, banished from Iceland, sought refuge in Greenland, and since Leif, Eric's son, discovered Helluland, the land of flat stones, or Labrador, the North-West American Arctic had been bombarded in its icy fastnesses by ship after ship. There is some reason to believe that Scandinavians entered the Hudson's Bay and voyaged up our western Red River as early as 1362. After Columbus had rediscovered the continent, and the Pope had given it all to Spain,

as he gave the African route and lands to Portugal, there was really nothing left for the British but to find some way of reaching China by the North. John and Sebastian Cabot in 1497, the Cortereals, Martin Frobisher in 1576, to whom the Virgin Queen "bade farewell, shaking her hand at us out of the window," John Davis, Henry Hudson in 1610, Thomas Button, who planted the British flag first on Manitoba soil in 1612, Jens Munck, whose crew rotted away with scurvy during the long winter of 1619 at Port Churchill—these were but the forerunners of scores of captains and admirals who strove to break through, one so confidently that he carried in his pocket a letter from James the First of England to the Emperor of Japan. Yet after three centuries the secret of the Arctic was still locked in polar ice. But now, with Napoleon conquered and exiled, Parliament offered twenty thousand pounds for the discovery of a North-West passage and five thousand pounds to the first man who would reach 89 degrees north latitude. For fifty years thereafter the favourite outdoor sport of the British race was arctic exploration. In 1819 a plan was proposed of an overland expedition to explore the shore line of the solid continent. The leader was, as we have seen, Lieutenant John Franklin of the Royal Navy, who had had a sight of polar ice the year before at Spitzbergen. He had with him, besides Dr. Richardson, two midshipmen, George Back, afterwards Sir George, and Robert Hood, who was to lose his life, and one English seaman.

When Richardson met Franklin he wrote of him as "A steady, religious and cheerful man and altogether an honour to the profession." Franklin might have written much the same of Richardson, though we doubt if he was so cheerful. The work expected of Richardson as naturalist was to collect minerals, plants and animals, and observe phenomena generally. He confessed that his knowledge about these things was very limited, but he did all he could to extend it, and looked forward to "a rich harvest in a country never before visited by a naturalist."

The Hudson's Bay ship, Prince of Wales, sailing to York factory in 1819, was held back by ice and nearly destroyed. On board with our party were men, women and children bound for Lord Selkirk's Red River colony. Even the women took turns at the pumps. The delay cost the explorers a year of time, for they were forced to winter no farther inland than Cumberland House, and to spend a second winter at Great Slave Lake, before the real adventure began.

In this nearly two years of preliminary travel, preparation and weary waiting, when Richardson the leader, or the surgeon, chanced to be at leisure, Richardson, the naturalist, was always occupied. Honest man though he was, he evidently had something to do with inventing, or at least exporting, the fiction that North-Western sub-zero temperatures, whatever the thermometer may say, do not really feel cold. From Cumberland House he wrote that—

"The cold we have already experienced is almost thirty degrees below zero, but we . . . find this degree of cold not so disagreeable to the feelings as many of the damp winter days in Britain."

At the opening of the season of 1821, the party of twenty-five—British naval officers, Canadian voyageurs and Indians,—set out, against advice of the fur companies' experienced travellers, carrying not more than a day's provisions, and having none *en cache* for their return journey, descended the Coppermine, reaching its mouth in July, and explored five hundred and fifty miles of coastline to the eastward, before they decided at Cape Turnagain that it was time to get back to winter quarters. Then everything went wrong, and the story of the return journey is one of the grimmest of all the Northland epics. It is worth reading to see what human beings can endure. The leaders knew nothing of this kind of travel or of voyageur or Indian psychology. Eleven men were lost. Cannibalism broke out among the Indians. The survivors crawled back, gaunt skeletons, kept barely alive by half-rotted deer skins and charred bones scraped from the snow at their old encampments and the scanty, unsatisfying and griping lichen, *tripe de roche*. Richardson almost lost his life, swimming with a line across a swift, icy river. He it was also who remained behind with the exhausted Hood, and it fell to him to deliberately execute a crazed Indian cannibal.

The truth about the expedition likely is that, capable and high-minded men as the leaders were, they depended too much upon their own unalterable plans, and did not advise with the traders of the two companies who knew the country and its ways, and the people of the country and their ways. Alexander MacKenzie, Thomas Simpson, and Dr. John Rae did much better Arctic exploration upon land than inexperienced men from overseas did or could, and, indeed, the two latter named finished up their job for them.

On his return home Dr. Richardson wrote his part of the general story of the expedition, and worked out the natural history observations and, in addition, prepared an appendix on zoology for the narrative of Captain Parry's second voyage of discovery in the polar seas during the years 1821-23. In 1824 he was appointed surgeon of the division of Marines stationed at Chatham.

THE SECOND FRANKLIN EXPEDITION

In 1824 it was resolved to attack the North-West Passage at three points, on both flanks and at centre, Parry again on the east, Beechey through Behring Strait, and Franklin down MacKenzie's River. Again Richardson joined him as second in command, surgeon and naturalist. This time all conditions were different. Sailing early in 1825 by monthly packet to New York, they ascended the Hudson River by steamboat, and from Montreal pushed by canoe up the

old route of the North-Westers by the Ottawa, the Great Lakes, Kaministiqua, Lake of the Woods, Winnipeg River and Lake, reached Cumberland House in July, and Fort Franklin on the lower MacKenzie six months after leaving England. The benevolent despot of the now united fur companies, Governor George Simpson, gave the expedition a "business manager" in Peter Dease, and put the experiences and resources of the Hudson's Bay Company at their disposal. The leaders considered it, by comparison with the former journey, a sort of picnic party. A botanist, Mr. Thomas Drummond, "the most indefatigable collector of specimens of natural history" Richardson had ever seen, was left at Cumberland House. Here, by the time the party had returned, he had collected, besides masses of notes, no fewer than 1,500 plants, 150 birds, 50 quadrupeds and a considerable number of insects, no doubt including myriads of mosquitoes.

Wintering on the lower MacKenzie, a mail from home arrived. To Richardson the people in England "seemed to be going mad about railroads, tunnels, steam engines, mines, diving bells," and he supposed "the mania would extend to Scotland also if there was money enough there to play the fool with."

Early in the summer of 1826 the party separated. Franklin, from the mouth of the MacKenzie westward explored 374 miles of coast but, unfortunately, stopped just a little short of Cape Barrow where Beechey's men were waiting for him. Richardson covered the interval from the mouth of the MacKenzie eastward to the Coppermine, connecting thus with the previous exploration, mapped the shoreline, and gave the name, Wollaston, to the island opposite. "Having added extensively to the geographical knowledge of the North American coast, made important experiments in magnetism and of the effect of the aurora borealis on the needle, and secured large collections of natural history, especially in the department of botany," the party arrived back in London in September, 1827. Dr. Richardson, who was now forty, resumed his duties at Chatham, worked steadily also over the narrative and scientific data of the second expedition, and now considered himself well enough equipped to begin a work he had long had in mind, his *magnum opus*, "*Fauna Boreali Americana*, or Natural History of the Arctic Regions," the first volume of which was published early in 1829 and the last nine years later, in 1838.

Shortly after the second expedition Dr. Richardson was appointed Chief Medical Officer of the Melville Naval Hospital, and in 1838 to the Royal Hospital at Haslar, near Portsmouth. Up to old age, with the interruption of a third expedition, his chief professional interests were in the medical and surgical work of a naval hospital. In spite of other interests, or it may well be because of them, he was strictly "on his job" at the hospital. When cholera came the nurses and officers thought their chief never slept. He believed that patients should be seen and prescribed for before breakfast, to make them comfortable as early as possible, and to keep assistants and nurses on the alert. "His words of accost, whether of recognition, sympathy or congratulation, were wonderfully few and pithy, and he had a clever way of questioning that drew from the patient much more information than he apparently sought, and from which he could judge how far his orders had been attended to by his subordinates."

Dr. Richardson was one of the first in Britain to dare to take insane people out of the dark cells in which they had been huddled like felons, to strike off their fetters and strait jackets, and put them into ordinary wards as patients. He finally won the day with the Admiralty, not by proving that his new treatment was more humane, but that it was less costly. However, he won. He was able to persuade the Admiralty also, when a ship arrived off Portsmouth smitten with a most malignant type of fever, to let him take the sick ashore for fresh air and hospital care rather than leave them to swelter between decks in the rank air aboardship. Even before the day of Florence Nightingale he spent some part of the honeymoon of his third marriage abroad visiting Pastor Fliedner's institution near Düsseldorf for the training of nurses, as this phase of hospital work interested him greatly.

In 1840 came promotion to the post of Inspector of Hospitals for the Admiralty. In addition to publications already mentioned, including the several volumes of the "Fauna Boreali", he now published in succession "A Report on North American Zoology," "The Mammalia of Captain Beechey's Voyage to the Pacific and Behring Straits," "A Paper on the Frozen Soil of North America," 'Observations on Solar Radiation," "Plates on Rare Fishes," and "The Ichthyology of New Zealand," and read to the British Association at Cambridge a paper on the "Ichthyology of the Seas of China and Japan." What could the Government do but offer knighthood to a man of so great and varied services? Her Majesty, the youthful Queen Victoria, graciously made him Sir John.

THE SEARCH FOR FRANKLIN

Franklin and Richardson returned from the second expedition in 1827. Three years later John and James Ross, uncle and nephew, knocked again at the doors barred by icebergs and sealed by frost and snow. When years passed and they had not returned, Richardson offered his services. Captain Back and Dr. Richard King did go, by land, and followed Fish or Back's River to the coast, though the Rosses got home safely ahead of them. Thomas Simpson, a cousin of Sir George, in 1837-39 worked out almost all that remained of the coastline, and Dr. John Rae finished it in 1846.

In 1845, the coastline being now pretty well determined, Sir John Franklin, who had in the meantime left a deep impress upon a backward

colony as Governor of Van Dieman's Land, set off again, not this time on land but on his own proper element, in the "Erebus" and "Terror". When in three years there was no word, expedition after expedition set out to find him, while the whole world watched and waited. Sir John Richardson's offer to substantially repeat the expedition of 1825, and search the coastline of the solid continent eastward from the mouth of the MacKenzie, was accepted, and Dr. John Rae of the Hudson's Bay Company consented to go as second in command.

Travelling more rapidly even than in the second expedition, they reached the mouth of the MacKenzie the first summer and explored eastward. Beyond the mouth of the Coppermine unusual ice conditions held them back, the season's search came to an end, and the journey back to winter quarters at Great Bear Lake was one of considerable difficulty. Richardson was now sixty-two, and not the traveller he had been. He had a definite heart attack. In the spring he considered it the better plan, as indeed it was, to give Dr. Rae the leadership and let him try the coast again, with a smaller party, while the older man returned to England.

As a traveller Sir John Richardson was simply omnivorous. All that he met was of interest to him. He liked whate'er he looked on, and his looks went everywhere. Observations of men and the ways of men, of places and events, but chiefly of rocks and trees, birds and flowers, fill two interesting volumes, published after the relief expedition. When the bonds of the long sub-Arctic winter were broken, and flowerlets peeped out beside the snowdrifts, and birds began to twitter to the growing sun, the poet in the man broke through his customary reserve and somewhat ceremonial style. "Now the season seemed to be striding onwards rapidly and the tender foliage was trembling on all sides in the bright sunshine . . ." "Constantly since the first of June the song of the *fringilla leucophyrs* had been heard day and night and so loudly in the stillness of the latter season as to deprive us at first of rest. It whistles the first bar of 'O dear, what can the matter be' in a clear tone as if played on a piccolo fife . . . The woods being now in full but tender foliage were beautiful. The graceful birch in particular attracted attention by its white stem, light green spray, and pendant golden catkins."

His many interests were often mingled, as when he studied together botany and Indian pharmacology.

"The *heuchera Richardsonii* (a saxifrage), which abounds on the rocks of this river, is one of the native medicines, its astringent root being chewed and applied as a vulnerary to wounds and sores . . . The leaves of the *ledum palustre* are also chewed and applied to burns, which are said to heal rapidly under their influence. The cake of chewed leaves is left adhering to the sore until it falls off. . . The *artoca alba* grows abundantly here. It is called by the Canadians 'la racine d'ours' and by the Crees 'musqua mitsu' (bears' food); a decoction of its roots and of the tops of the spruce fir is used as a drink in stomachic complaints. . . The *acorus calornus* is another of the indigenous plants which enter into the native pharmacopea, and is used as a remedy in colic. About the size of a small pea of the root dried before the fire or in the sun is a dose for an adult, and the pain is said to be removed soon after it is masticated and swallowed. . . A drop of the juice of the recent root is dropped into inflamed eyes and the remedy is said to be an effectual though a painful one. . . The *geum strictum* grows plentifully on these portages and is used by the natives for the purpose of increasing the growth of their hair. They dry the flowers in the sun, powder them, and mix them with bear's grease. . . The *dog bane* and *Indian hemp* grow luxuriantly on the sandy banks of this river. They abound in a milky juice which, when applied to the skin, produces a troublesome eruption. . . The second named species grows more robustly and erectly than the other and furnishes the natives living on the coast of the Pacific with hemp out of which they form strong and durable fishing nets."

The journal of the relief expedition had two hundred and forty pages of separate and detailed appendices on geography, geology, climatology, the sequence of events in the seasons at various places in the North, the thermometer, the distribution of plants north of the forty-ninth parallel, cereals in the north, a forty-page appendix on trees and shrubs, a twenty-page list of plants, and, to complete the whole, a list of insects.

Still expeditions went and came, adding much to knowledge of the Arctic regions, but little to the story of Franklin and his fate. Four medical men, it may be observed, were leaders of expeditions, Sir John Richardson, Dr. John Rae, Dr. Elisha Kane, whose journal has almost as much to say of scurvy as of polar ice, and Dr. Hayes. It was Dr. John Rae who finally, in 1853, eight years after Franklin had set out, chanced upon traces, and indeed skeletons also, of the ill-fated party. In the meantime, searching expeditions had mapped seven thousand miles of new coastline. The saying that summed it all up best, and was carved on the London monument to Sir John Franklin, was Richardson's: "They forged the last link with their lives."

A Full Life

For one who touched life at so many points as Sir John Richardson, life had scarcely an empty minute. His travels were still to ponder over and write and even re-write about, and also his friend Franklin. He still wrote about natural history, especially his beloved fish. His hospital work was after his own heart, a happy family was growing up around him, and he was now a very well-known man, welcome in any circle. He was at an evening gathering at Lady Franklin's, with Thomas Carlyle present, when word came that Louis Philippe had fled and France declared herself a republic. "There was a dead silence. Carlyle threw himself back in his chair, clapped his hands, burst into a loud laugh and left the room. We did not see him again."

An interview well worth recording was that between Sir John, Inspector of Hospitals for the Admiralty (and would have been Director

General but for advancing age), and Florence Nightingale. He writes his wife as follows: "Yesterday I went by appointment at five o'clock to wait on Miss Nightingale, and talked with her till seven, during all that time answering questions, and occasionally making some remarks on the present state of the public departments and hospitals. I was glad to find that our opinions were precisely alike. She wished to know the mode of conducting the naval hospitals, and how the medical officers obtained alterations, amendments and supplies. After I had detailed my experience, she remarked that it was nearly as bad as in the army, and believed that both were branches of the Circumlocution Office. The only advantage which I could point out was that the Admiralty are much more liberal in their supplies. There is the same difficulty in introducing the improvements of modern science, from the number of channels through which every suggestion must pass, until the head of the office is called upon to decide regarding a matter of which he knows nothing, all the reasons for the change having filtered away in the progress upwards of the proposal. 'The weary Treasury', she says, 'is at the root of all the evil'. Miss Nightingale is an earnest reformer of the right sort, and fills out, I believe, the ideal picture which your mother has formed of her, but she has not your mother's faith in public men. She believes that the grievous failures of the past will not produce much future amendment. She is very like the print of her at Lanerigg, and I should have known her at once, but has much more intellect of the countenance. She has a most brilliant and intelligent smile, a very pleasant and not patronizing address, but always perfectly self-possessed, quick in comprehending a subject, and distinct in her questions, which were calculated to bring out a correct view of the subject."

Among the young surgeons who served at Haslar under Sir John Richardson several rose to high places, and one to fame. Thomas Huxley dedicated to his old chief his "Oceania Hydrozoa", and, what is better, left a pen picture of him in what must have been his later days. With Huxley at Haslar under Sir John Richardson were Andrew, afterwards Sir Andrew, Clark, and two future Directors-General of the Medical Service of the Navy, afterwards Sir Alexander Armstrong and Sir John Watt-Read.

After nearly half a century in the medical and surgical services of the navy, Sir John, now sixty-eight, retired from formal duties. The ten years of evening which rounded out his life were as full as any of its earlier decades, but occupied, as such years ought to be, not with daily rounds and common tasks, but with interests that have been interrupted and hobbies accumulated in the years of daily duties. He travelled and observed, dug up Roman remains, came to be an authority about these also, and kept up associations with a wide circle of men of kindred spirit. He fell whole-heartedly into the new interest in the study of words aroused by Max Müller and Archbishop Trench, and contributed to the Dictionary of Philology a complete index of the words used by Robert Burns, with their significations and cognates in Norse, Icelandic and Gælic. Living in the country, his professional skill was always at the service of his neighbours, great and small. After a life full and useful, and after a day pleasantly occupied, he drew a long breath, and was dead.

For any wayfarer in life, such a fellow-traveller as John Richardson is worth while. What he was, over and above what he did, deserves to be made companionable to us in a good biography. To follow the successive steps in his professional training and work is almost to live for an hour in the very medical world of the first half of the nineteenth century. And men of our North land should have a special interest in one who traversed it in three laborious expeditions, lived nearly eight years in it, and spent a lifetime in working over its natural history. Plants of northern Canada named by and for Richardson would make a garden of respectable size, and animals named by and for him a considerable zoo. Among the plants are, to use the common names, lady's slipper, black currant, desert willow, dwarf cinquefoil, mountain avens, buffalo plum, tick seed, blueberry, gentian, twine berry, bastard toadflax, sand daisy, prairie ragwort, pond weed, spear grass, bunch grass, wire rush, alum weed, loco weed, beard tongue, one of the asters and *entocha franklinii*, which it would seem Richardson introduced into the gardens of England. Among the animals are the Franklin ground squirrel or scrub gopher, the Richardson ground squirrel or "flicker tail", the Richardson kangaroo rat, Richardson's water shrew and the Richardson northern skunk. Then there are the well known Franklin gull and the Richardson owl. Let it be remembered to his credit by the more practical among us also that while almost to our own day the forty-ninth parallel was supposed to be about the northern limit for wheat growing, Richardson a half century earlier placed the limit about the sixty-fifth parallel, and reported upon cereals actually growing there and then.

He had in his life many of the conventional honours, and some special marks of distinction as well. His was, perhaps, a life of industry more than a life of genius, but it was a full, good life, and even in many ways a great life. It is not every day that we meet in one person—surgeon, physician, sailor, soldier, administrator, explorer, naturalist, author and scholar, who has been eminent in some roles and commendable in all.

Hospital Service Department Notes

THE PHYSIOTHERAPY DEPARTMENT IN THE HOSPITAL

The interest of hospitals in physical therapy is steadily increasing. The development of massage, remedial gymnastics, electrotherapy, heat and light therapy has proceeded to the point where fairly general recognition of the scope and the limits of this branch of medicine has been reached. In conjunction with other recognized forms of medical and surgical treatment it has been found effective in fractures, anterior poliomyelitis, nerve injuries, arthritis, postural defects and many other conditions. Most hospitals have partial equipment at least and many have developed quite extensive departments.

Excellent equipment may be obtained from a number of manufacturers, but the essential factor from the physician's viewpoint is that of properly trained assistants. The physiotherapist or nurse in charge can "make or break" this department. The confidence of the public, and especially of the medical profession, is not as easy to obtain as in other fields of medicine; it is essential also that this department never recommend treatment for purely monetary reasons, a factor difficult to control in unregulated establishments.

In order to distinguish those physiotherapists with proper qualifications the Canadian Association of Massage and Remedial Gymnastics was formed in 1920. These workers, distributed in various hospitals throughout Canada, carry out their treatment *only under doctors' orders,* and therein lies the essential difference between this Association and other groups engaged in this same kind of work throughout the country. A similar organization of Biophysical Assistants (B.P.A.) "who possess the proper skill and training, and who are under the control of an ethical code," has been supported by the British Medical Association, which arranged with the Society of Apothecaries for the annual publication of a roll of their physiotherapists, this list being sent to all registered medical practitioners, medical and public libraries, and public medical officers. The British Institute of Radiology and the Chartered Society of Massage and Medical Gymnastics approved of this proposal and voluntarily cooperated to make it effective. This interest in ethical physiotherapists by the medical profession is worthy of commendation.

During the war, when the incidence of cases requiring physiotherapy was high, a large number of workers were trained in the temporary schools of physiotherapy. But now most of these workers are not available, there is a shortage of trained assistants, and we have been dependent in part at least for workers from England and elsewhere. To meet this condition the University of Toronto undertook a year ago to provide an adequate course of training in massage, muscle re-education, electrotherapy, etc. This is a two-year course of training, and includes considerable hospital instruction under trained supervision. For several years the university has had also a two-year course in occupational therapy. For those requesting it an arrangement has been made to combine these two into a special three-year course, thus turning out a graduate of unusually high qualifications. As the first graduates of the course in physiotherapy will be available in May, this information may be of interest to those members of the Canadian Medical Association whose hospitals are considering the establishment of such a department or the enlargement of one already existing.

It is sometimes difficult to know how much equipment should be purchased. It is quite easy to over-equip a department; conversely, too meagre an armamentarium limits the results which may be obtained. Among the factors governing the decision are (1) the enthusiasm of the staff for this branch of therapy, (2) the amount of physiotherapy done by doctors in their own offices (3) the class of patient served, (4) the money available, (5) the space available and (6) the ingenuity of the department personnel, including the hospital carpenter and plumber, in improvising certain apparatus Data on these subjects are on file in the Department of Hospital Service library. We are indebted also to Dr. John Coulter, of Chicago, Assistant Professor of Physiotherapy at the Northwestern University Medical School, and a member of the Council on Physical Therapy of the American Medical Association, who has kindly offered to assist our Department in the appraisal of the physiotherapy requirements of Canadian Hospitals. This would be based upon a study of the various types of clinical cases under treatment, the amount of physiotherapy equipment required being calculated from the number and proportion of these various cases admitted or treated annually.

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, Secretary, 184 College Street, Toronto.

"SHOULD THE SUPERINTENDENT OF THE HOSPITAL BE A PHYSICIAN?"

This question has been debated pro and con in hospital circles for many years. In the particular community from which the query comes, a group of interested persons believes that a physician whose training and education fit him for the conduct of both the business and the medical aspects of hospital work would be preferable to a lay superintendent.

It is interesting to note that of the 90,903 physicians belonging to the American Medical Association there are 2,448 hospital superintendents of whom 1,313 occupy full-time administrative positions. The remainder of the nearly 8,000 hospitals in the United States are administered by nurses and lay men and women of more or less adequate medical and business training. It goes without saying that the hospital superintendent must possess the quality that has been termed a "medical-social consciousness," He need not always be a graduate in medicine to be successful. Yet it cannot be denied that the training of a nurse or a physician is often found advantageous in the administration of hospital affairs. On the other hand, the most skilled physician might utterly fail to understand the physical problems that present themselves, while it must be also remarked that a superintendent may present a record of efficiency in the business world of which anyone might well be proud and yet absolutely fail as a hospital executive.

No one can submit a hard and fast rule covering the type of person best fitted for hospital work. If a physician can be secured with a strong trend towards and a liking for business matters and who at the same time possesses that valuable quality called "tact," which has been translated into administrative ability, he is likely to possess favourable qualities for hospital work. In the community to which reference has been made it would seem that since there is a strong feeling towards securing a physician as superintendent of the local hospital, this effort should be made.—*Modern Hospital.*

WHY ACCIDENTS WITHIN THE HOSPITAL SHOULD BE REPORTED PROMPTLY

The superintendent of the hospital should be in possession of the facts relative to every phase of the hospital's daily activity. It should not be necessary for him to secure a delayed report on a major or minor accident when, for some reason, inquiry is made concerning such an occurrence.

Frequently there appears to be a tendency on the part of nurses and physicians to conceal or at least to withhold from those in authority the facts concerning an occurrence that might have been prevented. A tendency, harmful in its effects, to cover up such happenings is too often seen. The fear that nurses and physicians sometimes display of being regarded as spies if mistakes in technique are reported is difficult to overcome.

Hospital accidents are of all grades and types. They range from the administration of medicine in improper doses to such catastrophes as fires, patients falling from heights, or even suicide. Major occurrences are normally brought to the superintendent's attention promptly, but there is a great variety of minor mishaps and mistakes which, to the patient and his relatives, appear as major. When complaints concerning such occurrences are brought to the superintendent, it should only be necessary for him to turn to a file and produce first-hand information as to the happening.

It is customary for a routine accident and injury sheet to be part of the official system of forms employed by the institution. This sheet sets forth the exact time at which a supervisory nurse discovered contusions, abrasions, lacerations or other injuries to the patient and explains in detail how they took place. It also contains a space for a description by the physician of the injuries present, with his version of how they were caused. Such a sheet should be immediately forwarded to the superintendent of the hospital, preferably through the office of the superintendent of nurses, although in some hospitals such forms are executed in triplicate, one form proceeding to the superintendent of the hospital, one to the superintendent of nurses, and the third being placed on the patient's chart. Upon the receipt of such a notification, which in serious cases may have been preceded by a telephone call, the executive is able to proceed promptly with the investigation.

Any effort on the part of nurses, doctors or others to withhold information concerning relatively minor accidents, such as a patient's falling out of bed, the untoward effects of an overdose of drug, the appearance of a decubitus, or any other matter that is likely to bring adverse criticism to the hospital, should be emphatically discouraged. — *The Modern Hospital.*

DOCTORS' AID SOUGHT BY HOSPITALS TO ASCERTAIN THEIR PATIENTS' FINANCIAL STATUS

One very happy sign in the hospital heavens to-day is the increasing cooperation between doctors and hospital superintendents on the general matters of hospital administration. At a recent hospital convention another

avenue whereby the doctor could be of material assistance to the hospital was suggested.

The amount of money lost by our hospitals on bad accounts and on indigents for whose debts no municipality will assume responsibility is simply appalling. Moreover, many patients are permitted to occupy the best private rooms and to receive every luxury when investigation would have revealed no wherewithal to meet these obligations. In some provinces a delay in reporting patients as indigents reduces the likelihood of the hospital receiving the customary aid for this class of patients. It has been pointed out that the doctor is the one person who, in the majority of cases, is in a position to know the financial status of the incoming patient. If staff doctors would discourage patients taking accommodation which obviously they cannot afford, if the doctor on his first visit, or when he phones for accommodation, would take the trouble to inform the office staff of the possibility that the patient might prove to be a county or city case, or that the patient could well afford to pay for that which he seeks to obtain gratis, the saving per annum in the average hospital would buy many times over that much needed but long delayed clinical equipment desired by the medical staff.

PASSENGER PLANES AND FLYING NURSES

What is said to be the first employment of graduate nurses as part of the crew of air liners is reported by Boeing Air Transport Incorporated, a company operating mail and passenger planes from Chicago to Pacific Coast points. This service was described in a recent issue of *Hospital Management*.

These nurses, eight in number, are to travel as members of the air liner crews on the transcontinental routes. They will act as stewardesses. Graduate nurses only have been employed, not necessarily because they were graduate nurses but because nurses' training had schooled them in service and diplomacy.

In addition to graduation from an accredited school of nursing, and membership in the various professional associations, a number of special qualifications are demanded. A young woman must be "air-minded," must have an attractive likeable personality, and must not object to extra work when the occasion demands. Above all, she must be cultured, actively interested in current events, and well read. Inasmuch as the nurse will travel by passenger planes, it was necessary to set a weight limit of 110 to 115 pounds, with a height not greater than 5 feet 4 inches.

Medical Societies

THE HAMILTON MEDICAL SOCIETY

The Hamilton Medical Society met at the Nurses' Residence of the Hamilton Sanatorium on the evening of December 10, 1930, to hear a most instructive program on the subject of pulmonary tuberculosis and other chest diseases. The meeting was presided over by Dr. F. B. Bowman, the President, and the guest speaker was Dr. Robert Janes, of the Toronto General Hospital. The addresses dealt with cases of chest diseases,—for the most part, tuberculous conditions. The staff of the sanatorium presented a number of case reports that were of particular interest to the medical men, and an interesting discussion followed. Papers on the various aspects of tuberculosis were presented by Drs. Walker, M. Bray, T. G. Heaton, S. Kennedy and Paul Rabinovitch. The address of Dr. Janes illustrated to the members of the medical profession the great strides which have been made in the subject of chest surgery in the last few years.

THE HURON COUNTY MEDICAL SOCIETY

At a meeting of the Huron County Medical Society held recently in Seaforth, Dr. J. H. Holbrook, Chairman of the Committee on Inter-Relations of the Ontario Medical Association, and Dr. F. C. Neal, Counsellor of District Number Six, addressed the members on "State insurance". The large audience manifested lively interest in this most important subject, and it is hoped that work will be taken up along similar lines to that which is being done on this question in District Number Six.

THE LINCOLN COUNTY MEDICAL ASSOCIATION

The following officers were elected at the annual meeting of the Lincoln County Medical Association which was held on December 11, 1930: *President*, Dr. A. R. Lindsay, St. Catharines; *First Vice-President*, Dr. A. H. Greenwood, St. Catharines; *Second Vice-President*, Dr. R. E. Elderkin, St. Catharines; *Secretary-Treasurer*, Dr. C. G. Shaver, St. Catharines.

THE YORK COUNTY MEDICAL SOCIETY

At the meeting of the York County Medical Society which was held in Newmarket on December 16, 1930, the following officers were elected for the year 1931: *President*, Dr. J. C. R. Edwards, Newmarket; *Vice-President*, Dr. G. D. McLean, Woodbridge; *Secretary*, Dr. Carl Hill, Lansing.

THE NIAGARA DISTRICT MEDICAL ASSOCIATION

Medical men from all parts of the Niagara District attended a meeting of the Niagara District Medical Association at the Leonard Hotel, St. Catharines, on December 15, 1930.

Dr. George Wilson, Chief Surgeon of St. Michael's Hospital, Toronto, was the speaker of the evening, his subject being "Intestinal obstruction". This proved to be very interesting and instructive to those present. During the evening the following officers, all of St. Catharines, were elected for the ensuing year: *President,* Dr. Graham Harkness; *Vice-President,* Dr. Wallace Cunningham; *Secretary-Treasurer,* Dr. Harry M. Parnell.

The closing event of the evening was a sumptuous dinner which was enjoyed by all.

THE PETERBOROUGH COUNTY MEDICAL SOCIETY

The Peterborough County Medical Society held an interesting meeting in Peterborough on December 18, 1930, when Dr. A. A. Fletcher, of the staff of the Toronto General Hospital, gave an address on "Chronic arthritis." Dr. Fletcher gave a comprehensive review of the subject, pointing out the complexity of the factors involved and the necessity of therapeutic attack being directed against all conditions having demonstrable etiological significance. He reviewed his own work on the nutritional factor in arthritis, citing instances of clinical improvement under adequate dietary treatment, having particular regard to vitamin content. He presented as objective evidence of nutritional disorder in arthritic patients x-ray films of elongated, dilated colons, with reduction or complete loss of haustrations. Under suitable treatment, there was improvement in the tone of many of these colons, and the reappearance of haustral markings. The discussion which followed gave evidence of marked interest in the subject.

THE SUDBURY MEDICAL SOCIETY

At a meeting of the Sudbury Medical Society on December 19, 1930, two excellent papers were given by Dr. Frank O'Leary, of Toronto, one dealing with important points in gynæcology and the other on the handling of emergencies in obstetrics. The meeting was well attended and the papers much appreciated.

THE THUNDER BAY MEDICAL SOCIETY

The annual meeting of the Thunder Bay Medical Society was held in the Prince Arthur Hotel, Port Arthur, on December 19, 1930, commencing with a banquet attended by thirty-four members of the Society and guests. The following officers were elected for the year 1931: *Honorary President,* Dr. Geo. Wilson, Toronto; *President,* Dr. H. R. H. Bryan, Port Arthur; *Vice-President,* Dr. R. C. Bull, Fort William; *Secretary-Treasurer,* Dr. H. J. Ferrier, Fort William.

Dr. Bryan spoke at some length on the affairs of the Ontario Medical Association as they affect the district. He has promised to devote the whole of the next regular meeting to a discussion of Association matters.

THE ESSEX COUNTY MEDICAL SOCIETY

Dr. Sherwood Fox, President of the University of Western Ontario, was the guest speaker at the annual banquet of the Essex County Medical Society which was held at the Essex Golf and Country Club on December 31, 1930. Dr. Fox's subject was "I go fishing". Dr. Robb, President of the Wayne County Medical Association, also spoke. The toast to the medical profession was proposed by Dr. L. G. McCabe, and responded to by Dr. J. M. Young. About seventy members of the Society were present.

THE SOUTH WATERLOO MEDICAL SOCIETY

The South Waterloo Medical Society met at the City Club, Galt, on January 9, 1931, with practically 100 per cent present. The subject for discussion was "The medical and surgical treatment of lung conditions." Dr. E. N. Coutts, of the Freeport Sanatorium, and Dr. J. H. Holbrook, of the Mountain Sanatorium, Hamilton, spoke on the medical side, while Dr. R. M. Janes, of Toronto, dealt with the surgical treatment. This was one of the most successful monthly meetings ever held by the Society.

J. H. ELLIOTT

THE REGINA AND DISTRICT MEDICAL SOCIETY

Dr. D. S. Johnstone supplied the moose meat for the December dinner of the Regina and District Medical Society. Later, he addressed the meeting on his visit to Dr. Bloodgood's clinic at Baltimore. He described Dr. Baer's new maggot treatment of wounds. In the diagnosis of malignancy he stressed the importance of x-ray pictures. Films are sent to Dr. Bloodgood from all over the eastern and mid-western states. There the pathologists, radiologists and surgeons all work together on the diagnosis and treatment of these cases. He quoted Dr. Bloodgood as saying that group-medicine is bound to be the future development. No diagnosis in this clinic is considered complete until the patient has been followed five years. Similar clinics through the country were recommended, to educate doctors up to the present day requirements

in diagnosis and treatment of bone lesions.

Dr. C. M. Henry addressed the meeting on "X-ray treatment of skin lesions". He outlined the treatment of acne, impetigo, eczema, psoriasis, carbuncles, tinea, warts, erysipelas, scabies, nævi, keloid, alopecia, adenoma, skin neoplasms. He stated one x-ray dose was a sure cure for erysipelas in twenty-four hours.

LILLIAN A. CHASE

THE ACADEMY OF MEDICINE, EDMONTON

The first regular meeting for 1931 was held in the medical building, University of Alberta, on January 7th, about 60 members being in attendance. Reports for the year 1930 were given by the retiring President, Dr. Douglas, the Secretary, Dr. Orr, and the Treasurer, Dr. Day, indicating a very satisfactory year.

The subject for the evening was "The kidney in health and disease" and took the form of reports on a symposium on the subject held at the University of Minnesota, Minneapolis, in July, 1930, which was attended by the following named gentlemen as delegates from Alberta, and who in making their reports gave highly scientific, instructive, and interesting papers on the subject. Under the head of Pathology, Dr. J. J. Ower, Professor of Pathology of the University, with the aid of lantern slides discussed fully the anatomy, physiology, and latest pathological findings in connection with the kidney in health and disease. Dr. Heber Jamieson, Associate Professor of Medicine, took up the subject under the head of nephritis. Dr. W. H. Scott, Assistant Professor of Medicine, discussed the matter of hypertension, and Dr. M. Weinloss, Demonstrator in Pathology, laboratory and clinical tests.

After an animated discussion, the President, Dr. Mooney, at the close of the meeting expressed for the members of the Academy their appreciation of the very full and comprehensive manner in which the subject had been dealt with by the different speakers.

For the current year the officers elected are: *President,* Dr. B. R. Mooney; *First Vice-President,* Dr. J. G. Young; *Second Vice-President,* Dr. H. Orr; *Secretary,* Dr. H. K. Groff; *Treasurer,* Dr. F. Gillespie. *Committee,* Dr. T. H. Field, Dr. W. C. Redmond, Dr. P. A. Macdonald.

T. H. WHITELAW

Special Correspondence

The Edinburgh Letter

(*From our own correspondent*)

On November 19th, the City of Edinburgh conferred the Freedom of the City on the Prime Ministers of Canada, Australia and New Zealand; the Right Hon. R. B. Bennett, the Right Hon. J. H. Scullin, and the Right Hon. G. W. Forbes. After the ceremony the Prime Ministers were entertained to lunch in the City Chambers. In the afternoon, in the intimate atmosphere of the Upper Library of the Old College, the three Premiers received the honorary degree of Doctor of Laws of Edinburgh University. After the ceremony the Principal entertained the Premiers, along with overseas students and other guests, in the University Union. In the course of the day the Prime Ministers visited the Scottish National War Memorial in Edinburgh Castle, and in the evening were the guests at dinner of the Overseas League.

In November, Sir Robert Philip, Professor of Tuberculosis at Edinburgh University, delivered the last of the Chadwick Lectures at the Royal Society of Arts, London. Sir Robert drew some interesting comparisons between the past and the present. Thirty years ago there were only one tuberculous dispensary and two or three sanatoria in Great Britain. There now exist some 500 tuberculosis dispensaries and more than 300 hospitals and sanatoria. We have now, as in no other country in the world, a uniform concerted scheme functioning more or less adequately in every part of the land. Fifty years ago in Scotland the death-rate from all forms of tuberculosis was 326 per 100,000; last year it was only 97. The decline in the mortality from tuberculosis has been much more rapid than the decline from all other causes. There is a remarkable inequality in the mortality from tuberculosis in different countries and in different cities. Thus, in 1925 the death-rate from tuberculosis per 100,000 of the population was in Sheffield 99, London 112, Manchester 158, Belfast 187. In cities outside Great Britain the inequality is even more striking. Comparable statistics for the year 1920 showed that the death-rate from tuberculosis per 100,000 of the population was in Washington (D.C.) 85, Chicago 97, New York 126, Philadelphia 137, Berlin 177, Paris 279, Warsaw 338, Vienna 405. These figures cannot be explained on the principle of a gradual immunization of civilized populations. The conclusion seems fair that the decline in mortality had been hastened by the more correct outlook on the field and the better adaptation of measures of attack and defence. By the adoption of certain procedures, it is possible to influence the morbidity of, and the mortality from, tuberculosis. To say that the decline in mortality, so evident in Great Britain, is referable

to causes acting uniformly throughout the world is to admit ignorance of the facts.

At the Annual Meeting of the Royal College of Physicians, Sir Norman Walker was re-elected President, Drs. Fleming, Thin, Fordyce, Bramwell, Matthew and Hewat were elected members of Council. Dr. Thin was nominated vice-president, Drs. Orr and Fordyce were elected representatives on the Board of the Royal Infirmary. Subsequently Dr. G. F. Barbour Simpson was appointed treasurer, Dr. Robert Thin honorary librarian, and Sir Robert Philip curator of the research laboratory. The College voted a sum of 1,000 guineas to the Edinburgh Royal Infirmary Bicentenary Extension appeal.

Dr. Sydney Smith, Professor of Forensic Medicine in the University of Edinburgh, delivered the Henderson Trust Lecture for 1930, in the Anatomy class-room of the University, on "Alcohol and Behaviour". This Trust exists for the "promotion of phrenology" and the lecture was one of the series formed under a trust deed to assist in the advancement of brain-physiology. After considering the individual effect of alcohol the lecturer dealt with its social aspect. He pointed out that the consumption of alcohol in Britain has steadily and progressively diminished for a large number of years. The annual consumption of beer has diminished to one-half, and the consumption of whisky to about one-quarter of the amount used in 1900. In the present year this fall is continuing, there having been a decline of 835,000 gallons in the consumption of spirits. With this fall in the consumption of alcohol there has been a similar diminution in arrests for drunkenness, from about 200,000 in 1900 to about 60,000 in 1928. While we are slowly but surely becoming a more temperate people, it is interesting to inquire whether there has been a change in our criminal behaviour. Cases of murder show little change, averaging about 100 a year. Attempts to murder have diminished about 10 per cent; wounding has increased by a similar amount; and suicide has shown an increase of about 30 per cent, over the 1900-1904 figures. There was thus no obvious relationship to be seen between alcohol and these serious crimes, but, contrary to our expectation, they appear to go on in a fairly regular manner irrespective of the drinking habits of the people. If we take the figures for less serious violence, brawling and so forth, as measured by the number of cases of common assault, we find that there has been a diminution commensurate with that of drunkenness, the average annual number of assaults falling from 61,000 to about 25,000 cases during the last thirty years. In relation to crimes of a sexual nature, such as rape and indecency in general, one would expect to find some correlation with drunkenness, for alcohol not only appears to unleash the sexual desires, but also to diminish fastidiousness and control. We find, however, that whereas drunkenness has progressively diminished, these offences have progressively increased. Thus, in the period of 1900-1904, there were about 1,400 cases of rape and other sexual crimes annually, whereas in 1929 there were more than 3,000 similar cases.

After the lapse of more than a century the University of Glasgow has published a catalogue of the printed books in the valuable Hunterian Collection. This collection along with an endowment of £8,000 was left by William Hunter, the great physiologist and anatomist, to the University of Glasgow. The catalogue, prepared by Mr. Mungo Ferguson, Sub-Librarian to the University, makes a handsome volume of 400 folio pages, and is a credit to both compiler and printer. Dr. David Baird Smith has contributed a preface to the volume, and a topographical index of the fifteenth and sixteenth century books, This index shows how rich the Hunterian Collection is in examples of work from the earliest presses. Thus the Caxton Group, ten in all, is one of the finest individual collections of Caxton books in the world. Among the celebrated continental printers represented are Fust and Schoeffer of Mainz, Zell of Cologne, Koburger of Nurnberg, the Aldus family of Venice, and Stephanus, of Geneva.

A new infirmary has been erected at the historic town of Falkirk. Situated on the road between Edinburgh and Glasgow, Falkirk is the centre of a thickly populated coal-mining and industrial community. The total accommodation provided for in-patients in the new hospital is 144 beds. This figure compares strikingly with the 14 beds provided in the original Falkirk Cottage Hospital erected in 1889. A maternity block has been constructed for 24 patients. The new buildings are so planned that with a little additional work they can be extended to accommodate nearly 300 beds. Administrative quarters have been provided that will meet all needs should the infirmary ever be extended to its limit. Other provision for expansion has been arranged. The main operating theatre can be duplicated at short notice, while the kitchen has been so designed that its output of food, cooked by the latest steam, gas and electric devices, can be greatly increased. The new infirmary has been erected at a cost of £120,000 and will be ready in the course of a few weeks to receive patients.

In celebration of its twenty-first birthday, the Edinburgh Medical Angling Club held a most successful dinner in the Hall of the Royal College of Physicians, on December 8th. Dr. G. F. Barbour Simpson, the President of the Club, was in the Chair. To signalize the coming of age of this most successful society, Sir David Wallace presented the President, on behalf of the Club, with a replica of the Challenge Cup which is fished for every year at Loch Leven.

The Royal Army Medical Corps Territorial Association held its Annual Dinner in the Hall of the Royal College of Surgeons on December 13th. Major Guy, the Dean of the Dental Hospital, was in the Chair. Sir Norman Walker, President of the Royal College of Physicians, and Dr. Haig Ferguson, President of the Royal College of Surgeons, and Major-General Hannay, C.B., A.M.S., were present as guests of the Association.

Dr. J. Duncan White has been appointed University Lecturer in Radiology in succession to Dr. J. M. Woodburn Morison. Dr. White is a graduate of Edinburgh University. He was formerly assistant to the Brompton Hospital, and to St. George's Hospital, London.

GEORGE GIBSON

23 Cluny Terrace, Edinburgh.

The London Letter

(From our own correspondent)

The year 1931 sees the coming into force of two important pieces of legislation which should go far towards improving the health and happiness of these islands. The complicated Road Transport Act will, it is hoped, among other things, bring about a decrease in the mortality and morbidity figures for motor-car accidents, for it must be remembered that the motor-car is becoming a serious rival to the tubercle bacillus and other bacteria as an etiological factor. The second parliamentary product is the Mental Treatment Act which has three features of great importance to the medical practitioner. In the first place there is to be a great extension of voluntary means of treatment and for the first time in this country public mental hospitals will be able to admit persons who apply for treatment at their own request. Secondly, there is to be provision for temporary treatment in early cases, so that all sufferers from recent and even severe mental disorders can be received into a recognized institution, public and private, without formal certification or any application to a magistrate, in other words, without the stigma of ever having been labelled as insane, for a large proportion of recent cases of mental disorder may recover completely within the official period of six months now to be allowed for these temporary measures. The third section of the Act which profoundly affects the medical man is that which endeavours to give real protection against subsequent legal proceedings to the practitioner who signs recommendations or certificates. There have been some celebrated cases in the past ten years and the profession as a whole is very nervous about the whole matter.

Mental health being, so to speak, in the air, it is not surprising that several congresses have been devoting time to certain aspects of current problems. At a meeting of municipal associations interested in public health administration, recently held in London, one session was devoted to the early treatment of mental disorders, and the importance of an out-patient clinic in connection with a general hospital was emphasized, as well as the rôle to be played by the social worker. Mental deficiency was also before this congress and similar subjects were on the agenda for a conference arranged by the Central Association for Mental Welfare last month in London. Sterilization as a means of getting rid of mental deficiency was before both conferences, and representatives of the Eugenics Society again brought forward their carefully reasoned plea for some immediate experiments on a small scale, rather than postponement of action pending investigation of all the complicated factors involved. Other speakers, however, emphasized the extreme paucity of our knowledge on the relationship between heredity and mental defect, and it was evident that even among the authorities at these purely national meetings wide disagreement existed. It may be that something will have to be done about the ever increasing number of motor cars, in order to preserve the pedestrian, but it is doubtful whether attempts to limit the procreational activities of mental defectives by legislation would ever have the support of this liberty-loving land.

A welcome addition to modern literature on popular health has just appeared in the form of an official booklet published under the authority of the British Empire Cancer Campaign and entitled "The Truth about Cancer". This is most opportune, for, as mentioned in these notes only six months ago, the gullibility of the public as regards cancer cures and the harm done by the quack is by no means decreasing. One of the difficulties before the medical man who essays to educate his patients about cancer is the essentially scientific aspect of most published work on cancer research, but there are two facts that he can be sure about amidst a welter of controversy. Cancer is in its early stages a local disease and in this stage a complete cure is possible. This new book essentially drives home this simple creed, at the same time appealing to the intelligence of the non-technical public. It is, also, a sad comment on the attitude of the ordinary daily newspapers that scarcely one of them gave this excellent new product the welcome it deserved, but if a non-medical journalist had written a book to prove that cancer was due to eating plum-pudding he would have been sure of head-lines.

The Hospital for Tropical Diseases, in London, has just added new wards, pathological laboratories, and a clinical demonstration theatre. These extensions have largely been rendered possible by the transference of the School of Tropical Medicine to the new buildings of the London School of Hygiene and Tropical Medi-

cine in a neighbouring street. The new lecture theatre at the Hospital is dedicated to the memory of Manson, about whose life and work Sir Walter Fletcher, Secretary of the Medical Research Council, had something to say in an introductory address in his well-known style. Who else would have had the temerity to combine a tribute to the discoveries of Manson and Ross in their study of malaria with the dry fact that this disease claims *more* and not *fewer* sufferers in India than before the efforts of these pioneers?

ALAN MONCRIEFF

London, January, 1931.

Letters, Notes and Queries

Liver Extract in Diabetes

To the Editor:

In the issue of the Canadian Medical Association, September, 1930, I read the article about the effect of liver extract on the blood sugar of diabetic patients.

Could you please send me the latest information concerning the matter and the advisability of its use on diabetic patients?

WILLIAM OFFENKRANTZ.

Halifax

ANSWER.—Murphy and Blotner of Boston became interested in this question when they were treating patients who had pernicious anæmia with large amounts of liver. These anæmia patients had symptoms which appeared to be similar to those of patients with hypoglycæmia. They administered liver to diabetic patients; their original article appeared in the *Journal of Clinical Investigation*, 1927, **4**: 440. Their last article was in the *Journal of the American Medical Association*, June 7, 1930. In it they refer to the work of French authors who did work on this as early as 1896. Their work is well done and carefully controlled. In some cases they used 180 grams and in other cases 480 grams of liver, in the form of extract. They found that 480 grams of liver was equivalent to a little more than 10 units of insulin.

Regarding the practical use of this, the treatment should be carried out in a teaching hospital where at frequent intervals they take blood sugars, before the meal, 3 hours after, 8 hours after, and the blood sugars after insulin and after liver compared with those after no medication. From an economic standpoint there is no advantage because 480 grams of liver in extract form costs 60 cents and 10 units of insulin costs 6 cents, but the avoidance of hypodermics is a consideration.

I have used liver only on one case, and was unable to obtain blood sugars, but the insulin dose could not be lowered by its use in my one case.

I think the matter deserves study over a large number of cases where blood sugars are obtainable. The chief drawback is the expense.

Regina. LILLIAN A. CHASE.

Answers to questions appearing in this column should be sent to the Editor, 3640 University Street, Montreal.

Acidophilus Milk in the Treatment of Adults

To the Editor:

I should like to ask a question:— What are the indications for the use of acidophilus milk in the treatment of adults?

LILLIAN M. CHASE, M.D.

Regina.

ANSWER.—Acidophilus milk is most useful for the treatment of intestinal stasis with symptoms of intoxication, and when there is a lot of indican in the urine. It is useful in any form of chronic dyspepsia, and is best given with milk sugar.

R. H. M. HARDISTY, M.D.

Montreal.

The Incidence of Influenza in Isolated Regions

To the Editor:

I should be very grateful if you could publish a questionnaire in your *Journal* asking if any medical man has seen a case of influenza in a person who has been in an isolated situation, say on the prairies, and not in contact with any outsider for a period of weeks. While doing locum tenens in British Columbia in October and November, 1918, I heard of a prospector up in the hills there getting it severely, and yet he had been free from contact with outsiders for weeks, but I could not get this substantiated.

R. CHALMERS, M.D., F.R.C.S.E.

77 Coniscliffe Road,
Darlington,
Co. Durham, England.

Topics of Current Interest

Problems of Birth Control

The Seventh International Birth Control Congress was held at Zürich from September 1st to 5th. Though it was attended by representatives of eight different countries, the main contribution was made by speakers from Great Britain, the United States, and Germany. In Germany birth control is a political issue. It is opposed by conservatives and nationalists for several reasons, of which, according to Dr. K. Soloweetshik (Leipzig), not the least important is "the resentment aroused in government and medical circles by the unfavourable attitude of the rest of the world towards Germany." In the minds of socialists, however, birth control is an essential part of a wider movement aspiring towards political and moral emancipation. It is carried forward on an emotional wave which also sustains the issues of free-love and abortion. Much fervour was expended by German speakers upon this last subject. One of them, Dr. W. Pust, stated that between 1900 and 1930 Germany lost five times as many lives through the practice of abortion as she lost in the late war; that the number of abortions induced annually was greater than the number of living births; and that it was unusual for a German married woman not to have had an abortion at least once in her lifetime. By many German speakers it was vehemently contended that a modification of the German penal code in regard to abortion would be followed by an amelioration in maternal health comparable to what was reported by Dr. Martha Ruben-Wolf to have taken place in Soviet Russia.

Two obstacles to the progress of birth control in Germany were described. The first was a paragraph of the "doctor's oath" in which the individual doctor is exhorted "to refrain from all things tending to reduce the population or strength of the people." The second is a clause included in the new draft of the penal code of the German Reich that: "the public recommendation of articles to be used for immoral purposes renders the offender liable to not more than two years' imprisonment." Hence the birth control movement in Germany is at an earlier stage than in this country. It is still, largely, in the crusading stage, and it has not yet become detached and self-critical.

As regards contraceptive methods and technique, several points of interest arose, and we will comment on two of them. In the first place the increasing experience of different investigators with the Gräfenberg ring is tending to weaken rather than strengthen confidence in the suitability of this method for any but carefully selected cases. In a paper devoted to his own method, Dr. Gräfenberg stated that he had now fitted 1331 patients with his various intra-uterine appliances. With the silk stars and rings, now abandoned, he had had 3.1 per cent of failures; with the silver ring he had had 1.6 per cent. But his figures were not presented in anything approaching the detail that the conference would have liked. Dr. J. H. Leunbach (Denmark) reported having fitted the ring in 176 cases. From 23 of these it had subsequently to be removed, and from 22 it came out by itself. Four women lost the ring without knowing it; one woman became pregnant despite the presence of a ring which fitted well. In a much smaller series (15) Dr. Helena Wright (London) reported several unanticipated sequelæ, but the reports of Dr. Norman Haire (London, 270 cases) and Dr. Norbert Neufeld (Breslau, 30 cases) were more favourable. The general opinion of the conference seemed to be that the method best adapted to the requirements and capacity of the majority of women is a combination of a vaginal pessary—the Ramses and the Mensinga being the most favoured—and a spermicide. As regards the optimal size of pessary for average women—about which there has lately been correspondence in our columns—the statistical experience of the birth control clinics of the United Kingdom and United States is unambiguous. It is to the effect that large sizes are fitted in preference to small. Thus, at 26 American clinics through which had passed 36,804 women, the average sizes of pessary fitted were Nos. 70, 75, and 80. At 16 British clinics that had dealt with 45,321 women, the average sizes were 70, 72½, and 75. Of the 42 clinics whose records of sizes were submitted to the conference, the Cromer-street Clinic, in London, and the American clinic at Reading, Pennsylvania, fit the smallest sizes. The average sizes here used are 10-15 mm. smaller than the average for all the clinics.—*The Lancet*, 1930, **2**: 650.

Tularæmia Contracted from Coyotes

In June, 1925, Garberson, of Miles City, Mont., encountered a case of serologically confirmed tularæmia in a man who had been bitten by a coyote puppy (*canis lestes*). A typical indolent ulcer developed at the site of the coyote bite, accompanied by the axillary adenopathy characteristic of this disease. Careful investigation did not reveal any other probable source of infection. Parker decided

to investigate the susceptibility of the coyote to tularæmia. Three young coyotes were fed with the tissues of guinea-pigs and Belgian rabbits just dead of tularæmia. The coyotes died on the thirteenth, twenty-second and fifty-third day, respectively, after the infectious material was first fed. Emulsions of tissue of the dead coyotes were injected into guinea-pigs. The guinea-pigs died and necropsy revealed the typical spotted spleens and livers and enlarged caseous lymph nodes; *Bacterium tularense* was recovered in pure culture from the guinea-pig tissues. Injections of tissue suspensions of salivary gland tissue from two of the coyotes into guinea-pigs caused their death from tularæmia; this discovery introduces the possibility of a new avenue for the transfer of the infection to man by the bite of a wild rodent or carnivore. More recently, Kunkel has reported a case of typical ulcero-glandular tularæmia in a man who had killed and skinned an adult coyote. Just prior to the disposition of the carcass the patient cut his left index finger with an axe. The primary lesion developed at the site of the cut. There were no other animal contacts before the development of the illness. A blood specimen collected nineteen days after the onset of illness was submitted to the Hygienic Laboratory of the United States Public Health Service at Washington, where the serum was found to agglutinate *Bacterium tularense* in all dilutions to 1:1,280 thus confirming the clinical diagnosis of tularæmia. While the wild rabbit constitutes the important reservoir of infection for other animals and man, recent reports of new animal hosts and transmitter (woodchuck, opossum, muskrat, European water rat, sheep and quail) and new insect vectors (wood tick of California, *Dermacentor occidentalis* Newmann) indicate the ever-widening spread of the infection to other forms of animal and insect life. This situation is almost certain to result in the perpetuation of the disease among lower animal forms and thus increase the possibilities for the development of the infection in human beings.—*J. Am. M. Ass.*, Nov. 1, 1930.

Noise and Its Measurement

The universal problem of noise is at its worst, perhaps, in New York, where it has been approached scientifically and thoroughly. A brochure called City Noise publishes the report of the commission which has been investigating it. A year ago a travelling noise laboratory began a cruise of the city to measure the intensity of sound in various areas. Two devices were used: a measure of deafening effect and a "noise meter" that registered intensity directly through a microphone. The masking effect of any given noise was determined by the intensity necessary to make a known tone audible above it. The amount of noise is the difference between this intensity and the intensity required in a quiet place. This indirect method, depending on the human ear, was a useful addition to and check on direct measurements. The unit of noise—the decibel—is approximately the smallest change in sound which the human ear can detect; it is not an absolute unit, but a symbol for the ratio of intensities. In general, the numbers of decibels measuring the difference between two sounds is ten times the common logarithm of the intensity ratio. An ordinary conversation has a loudness of about 60 decibels—that is to say, 10^6 times the least intensity the normal ear can hear. A total of about 10,000 observations was made, and in several places the aggregate noise was analysed by means of band-pass filters.

The results showed that riveting and blasting were the worst noises of New York, measuring 96 or 97 decibels, but the average noise of a subway express passing a station was 94 decibels, while a loud-speaker at its noisiest accounted for 79—an intensity 100,000,000 times greater than the smallest distinguishable sound. The exhaust of a motor lorry accounted for 77 decibels, and the automobile horn for 71. At these levels, conversation is difficult, study impossible, and normal sleep almost out of the question. The average noise level inside rooms in residential districts was found to be 31 decibels, and approximately half the noise came from outside the house. Under normal traffic conditions a sound had to have a loudness of 50-55 decibels to be heard, and in main streets this might rise to 75 decibels. An amusing comparison with sounds from the Zoological Gardens showed that while a roaring lion (87 decibels) would be audible in the streets for 20 or 30 feet, a Bengal tiger (75.5 decibels) might roar indefinitely without attracting the attention of passers-by.

Great improvements have been made by padding turnstiles at the stations and replacing traffic-police whistles by lights. A series of tests was made on standard motor horns, and it was found that an adequate warning sound need not be startling or nerve-racking, and that the average horn was a great deal louder than necessary. Some of the horns could be heard ten miles off. Many horns were found to be unpleasant because of high notes, which could be filtered off. The only way to deal with construction and demolition noises seems to be prohibition during hours of rest and the provision of adequate mufflers on the intakes of air compressors. The commission recommended a "noise squad" as part of the City Health Department, and an extensive educational campaign, for they realize that there is no quick solution of the noise problem; the cooperation of every manufacturer, employer,

and employee is needed before any appreciable improvement can be effected.—*The Lancet*, 1930, **2**: 1164.

Noise and the Town Dweller

In an age of motor traffic, sirens, pneumatic road-drills, and intra-urban train services, it has become impossible for the city dweller to escape from noise even during his hours of sleep. Though the man whose house abuts on the railway will admit that he no longer notices the passing of a train, there can be little doubt that noise has a harmful effect on the mind, even of those who appear to be indifferent to it. The effort of concentration is considerably increased in noisy surroundings, and it has been repeatedly demonstrated that existing neurasthenia is aggravated by noise, and improved by a quiet environment. The effects are inevitably serious on young children and infants, whose nervous systems are insufficiently developed to withstand a prolonged strain; the child who has slept in the midst of uproar will awake listless and tired, and if the conditions persist his growth will suffer. The nursery schools have shown the value of a midday rest to the child who is kept awake late in a noisy and overcrowded home. In the annual report of the Willesden Urban District Council some of the difficulties in the path of legislation to reduce noise are discussed. Clearly the repair of the roads and the warnings of motor traffic are among the necessary evils of our civilization, nor is it very easy to legislate for the suppression of the crying infant, the howling dog, or the incipient pianist. By means of a meter designed to convert sound into measurable electric waves it has been possible to determine the effects of noise on the human body. Among other results it has been found that a sound of a given magnitude produces a reaction of fear in the newborn infant, that noise raises the blood pressure in the adult, and that a degree of noise insufficient to waken a sleeping person will cause the muscles to contract and to remain tense for as long as thirty minutes before they relax. Deafness, dizziness, and headache are the lot of those who earn their livelihood by boiler-making or cotton-weaving, and it has been estimated that for normal persons it requires 19 per cent more energy to perform duties in noisy surroundings than to perform the same duties in a quiet environment; the strain on those whose mental or physical health is not normal can be imagined. The Middlesex County Council has provided certain by-laws to reduce street noises, but these are directed chiefly against street criers and singers, and cannot affect traffic noise. The fact that many of our large hospitals are situated in the midst of busy thoroughfares makes the problem more urgent, since noise is clearly on the increase. Into the Middlesex County Council Bill, which is to come before Parliament next session, a clause has been introduced to give the local authorities the same powers with reference to noise that they have with reference to nuisance under the Public Health Act. This will apply to excessive, unreasonable, or unnecessary noise, wherever it is injurious to health, or where it is capable of being mitigated, having regard to all the circumstances, such as cost. In New York the Noise Abatement Commission has suggested fines for those who create unnecessary noise; sound-proof buildings and zones of silence round hospitals have also been advocated. A greater hope of prevention lies in removal of the cause by the provision of silencers, abolition of strident horns, destruction of worn-out machines, the use of pneumatic tires, and the substitution of electric welding for riveting. It is estimated that at least 75 per cent. of street noise could be abolished by these measures, and a movement in favour of noise abatement would do much to pave the way for the necessary legislation.—*Brit. M. J.*, 1930, **2**: 294.

A Silent House

A sound-proof music room is an old conception, but the possibility of a sound-proof house was newly demonstrated at Olympia during the recent Building Exhibition. The materials used for the construction of each of the rooms varied; the study was so closely panelled in African mahogany as to be almost impermeable to sound; cork parquetry on the floor and a muted typewriter helped to preserve an atmosphere of almost ecclesiastical repose. The furniture, of mahogany and also made to the design of Mr. Tristan Edwards, was utilitarian without being ugly. The dining-room walls were made of Canadian spruce set in three parallel partitions, an arrangement said to be not only sound-proof but heat-proof, cold-proof, and water-proof as well; a number of identical tables of African walnut could be scattered round the room or assembled to form a dining table of any dimensions required. The walls of the drawing-room were constructed of compressed wood fibre, an English product which is unusually resistant to water. A Sorbo rubber material underfoot gave a sensation of walking on cotton-wool. Silent gas fires were in every room, and the windows, glazed with ultra-violet glass, were set in steel frames. In the nursery a special arrangement of baffle boards in the upper ventilating flap of the windows allowed air to enter but excluded noise; equally, of course, the outer world and the rest of the house were insulated from the noise of the nursery. A rubber material on the floor was decorated with nursery pictures designed by Marie Petrie; the furniture was low

and adjustable. There were no special points of interest in the silent bathroom except a mirror with a luminous frame which lighted the inspected face. The kitchen was built of insulating bricks, hollow in the centre; it was furnished with electric cookers and with a large double dresser across the lower shelf of which articles could be passed directly from the stove to the sink. The bedroom, furnished with extreme simplicity, contained a box-spring mattress in the middle of the room, mounted on an arrangement of drawers which made it possible to dispense with a chest. Even the front door was approached silently across a rubber pavement, where a pattern of arrows directed at the entrance pointed the returning wanderer to his home. Although such complete isolation would be ideal for a study it might have its dangers if universal; it is possible to imagine the tenant in his sound-proof drawing-room oblivious to an alarm of fire. A more common occurrence would be neglect of the telephone, unless bells were to be fixed in every room.—*The Lancet,* 1930, **2**: 809.

Observations on the Hygienic Condition of Public Swimming Baths

In the baths examined by this author no chemical treatment such as chlorination was employed. The infections occurring from swimming bath water are dealt with under the following headings; intestinal infections, infections of the eye and ear, meningitis and poliomyelitis, naso-pharyngeal and respiratory infections, venereal disease and skin infections. Sources of contamination are detailed and the fact emphasized that the most serious pollution comes from the bather; skin, hair, and the secretions from the mouth, nose and throat. Colds, septic cuts, infective skin and other conditions all add infectious matter to the water. Regulations are important: (1) All persons must be required to take a cleansing bath in the nude before bathing. (2) Bathers leaving the pool to use the toilet are required to take a second cleansing bath before returning to the pool. (3) Bathers should be instructed to use the toilet and empty the bladder before taking the cleansing bath and entering the pool. (4) Any person with skin disease, sore eyes, cold, nasal or aural discharges, or any communicable disease must be excluded. (5) Spitting, spouting of water, blowing of nose, etc., in the pool should be prohibited. Scum gutters are provided for expectoration. (6) Bathers should be instructed that blowing of the nose to remove water is likely to force infectious matter into sinuses and inner ear cavities. (7) Divers should be advised to wear rubber caps over the ears or to plug the ears with greased cotton wool.

Summary and conclusions.—It is an undisputed fact that various diseases have been transmitted by the water of swimming baths, therefore it is important that steps should be taken to prevent their occurrence, by maintaining a standard similar to drinking water, by a process of continuous filtration combined with aeration and chlorination. In order to maintain the standard of purity thus obtained it is necessary that a strict supervision should be made of the bathers, and those who have any infectious condition should not be permitted to use the pond. Regulations similar to those suggested by the American Public Health Association should be made and enforced.—Abst. in *J. of State Med.*, 1930, **38**: 365.

The Church and Medicine

One of the resolutions of the recent Lambeth Conference called for cooperation between the clergy and the members of the medical profession. This was put forward as an urgent need, because the spiritual and the physical treatment of the sick were complementary and equally necessary for true well-being. It was not quite clear what measures were recommended for bringing this cooperation about, nor in what directions it could usefully take shape beyond the general friendliness and respect as between the parson and the doctor which exists already. It has remained for the Convocation of the Province of York to carry the matter a step further. In the Lower House last week Bishop Frodsham, vicar of Halifax, moved to ask the President (Dr. Temple, Archbishop of York) to convene conferences in the spirit of the Lambeth resolution. His idea was that conferences should be held in Leeds, Newcastle-upon-Tyne, Liverpool, Manchester, and Sheffield, the five university cities in the northern province which have medical schools, with a view to an approach to a closer cooperation with medical men on the subject of health and spirit. There were signs, said Bishop Frodsham, that the connection between the spirit and the body in the realm of healing was being forgotten. He appeared to feel that the true relation was being obscured by forces from two opposite sides; on the one hand a materialistic philosophy, and on the other such a principle as Christian Science, which maintained that health and disease were entirely of the mind. He thought that conferences between clergy and doctors might result in a better mutual understanding of the work of both. His resolution was seconded by Canon Brook, vicar of Doncaster, and carried. The Archbishop of York, to whom the resolution was committed for further action, has on many occasions spoken on this subject. One of his most notable deliverances was the sermon

which he preached at Manchester in connection with the annual meeting of the British Medical Association in 1929. He then stated that physical healing and the healing of the soul, although best carried out by separate hands, were not really different ministries. They were one, he said, in the purpose of God for His world. It is not a vague merging of these two ministries that will make for human good, but rather a clearer apprehension of the possibilities and territory of each.—*Brit. M. J.*, 1930, 2: 876.

Medico-Legal

Orthopædics and Faith-healing

We described last week the action recently taken by the Stoke-on-Trent Corporation against Pastor Edward Jeffreys, an evangelist, at whose faith-healing meetings splints and surgical appliances were, it was stated, removed from crippled children. The corporation required an undertaking that there should be no interference with the treatment of the children for whose care it is responsible; it also decided to cancel arrangements for the use by Pastor Jeffreys of municipal halls. On November 3rd the town clerk received a letter in which the evangelist explained that his only part with the sick and afflicted who attended his meetings was that of prayer. The letter declared that an open letter had been sent to Mr. Mitchell Smith, the orthopædic surgeon who had conveyed to the corporation the original complaints, with a challenge that "for every one case he can prove is worse I am prepared to bring forward 20 who can testify to physical blessing and healing." The material for examining this latter undertaking is at this stage hardly adequate and the challenge is thus the less likely to be taken up. A more satisfactory passage in the letter declared that, as the Bethel Evangelistic Society was primarily a spiritual movement and as the salvation of souls was regarded as of more importance than the healing of the body, the writer was prepared, "for the sake of the Kingdom of God and the peace of the city," to give his word that he would not touch any leg supports or plasters of any children under treatment by the various authorities of the district. "If it has been done in the past, it has always been with the consent of the parent or some responsible person." The corporation not being satisfied that the promise not to interfere with leg supports, etc., went far enough, the town clerk was directed to write afresh to Pastor Jeffreys. The latter in reply repeated his assurances in a form which the corporation felt itself able to accept. The controversy may therefore, it seems, be regarded as happily ended, and the ban placed upon the evangelist's meetings in local public halls has been removed.—*The Lancet*, 1930, 2: 1130.

Birth Registration Offence: Story of a Suppositious Child

A woman was convicted at Sunderland recently on a charge of perjury in respect of registering the birth of a child. The case put forward by the prosecution was remarkable. The accused, a married woman 37 years of age, was said to have adopted an illegitimate child and to have passed it off as the offspring of herself and her husband. The child was produced in court and was identified by a widow whom, in the light of the magistrates' decision, one must regard as the actual mother. The widow stated that the child was born to her on January 15th, and that on March 25th she advertised for someone to adopt it. According to the prosecution, the accused bought long clothes for the baby, and had it brought to her own house by night on April 18th; the real mother came to the house every morning for a fortnight, ostensibly to attend to the accused and the child; she was addressed as "nurse." A medical practitioner happened to be attending the accused for pleurisy; she took advantage (it was said) of this circumstance to represent that he was attending her in her confinement. A note bearing his name was sent to the medical officer's office to notify the birth as having occurred on April 18th—the date when, according to the prosecution, the three-months'-old child was conveyed to the house. The doctor repudiated the note. His evidence was that, during his visits to the accused, she told him she was pregnant, but declined to let him examine her. On April 19th he was sent for and found her in bed with a child wrapped up; she said she was all right, and that nurses were attending her. Accepting her story, which there was apparently no reason to suspect, he subsequently signed a certificate enabling her to obtain maternity benefit. The chief inspector of police said he obtained from the accused the name of the woman who was attending her, but he was unable to trace any such person. The accused had the child christened in her own name, and she registered the birth stating it to be the child of herself and her husband. On the other side the defendant flatly denied the story of the adoption. Her husband and

neighbours gave evidence in support of her statements that the child was born to her on April 18th. Having found her guilty, the magistrates fined her £10. This was the maximum on summary conviction until in 1925 the penalty was increased to £50. Had the charge been sent to the assizes for disposal—and such disputed issues of fact might well be thought more appropriate for decision by a jury—the maximum sentence would have been seven years' penal servitude.

In 1926, when the law of death certification and registration was amended, critics complained that there was still every opportunity left for premature burial and every facility for the concealment of crime. Irregularities in connection with the registration of births are perhaps not so serious as those with respect to deaths, but the Sunderland case suggests that here, too, the law may require re-examination. The medical practitioner is not primarily responsible either for notifying or for registering a birth, but existing statutes put upon him an indirect or secondary responsibility. He would be closely concerned in any proposed change.—*The Lancet*, 1930, **2**: 1034.

Doctor Barred from Practice

The Court of Appeal at Victoria, B.C., recently refused to restore professional status to Dr. Victor E. Latimer, Penticton physician, stricken off the register by the College of Physicians and Surgeons of British Columbia for alleged unprofessional conduct.

In a judgment handed down the court upheld the finding of the Medical Council that Dr. Latimer had administered narcotic drugs to Mrs. Helen Oliver for an improper purpose and denied Dr. Latimer's appeal heard recently in Vancouver, for restoration to the register of licensed practitioners. Mr. Justice McPhillips dissented.

The decision of the Appeal Court of British Columbia, refusing to restore professional status to Dr. Victor E. Latimer, is the latest development arising out of the "tar and feathering" incident in Penticton, B.C., more than a year ago, in which Dr. Latimer was the victim.

Charles Oliver, a son of former Premier John Oliver of British Columbia, and husband of Mrs. Helen Oliver, was tried on charges arising out of the "tar and feathering" incident, but acquitted.

Subsequently the Medical Council of British Columbia struck the name of Dr. Latimer from the register of the College of Physicians and Surgeons of British Columbia, charging unprofessional conduct. Dr. Latimer appealed to the courts and was permitted to practise pending decision in the case.

The Dog in the Car

A recent decision of the Court of Appeal will have interested the many medical practitioners who are owners both of motor-cars and dogs. One evening, 18 months ago, a man parked his saloon car with its back to the kerb in a street of a well-known shop in Oxford Street. Inside the car was his Airedale dog. As another man walked past the back of the car, the dog (which was said to have been barking and jumping about in the car) smashed the glass panel. A splinter of glass entered the eye of the passer-by; operation was necessary, and four days later the eye was removed. The victim of the accident claimed damages against the owner of the dog, alleging various forms of negligence. The defendant, he argued, was at fault in parking his car where he did, in placing the dog inside, in leaving the car and dog unattended on the public highway, and in failing to tie the dog up in a safe and suitable manner. The case was tried before Mr. Justice Talbot and a common jury, and the plaintiff was awarded £2,000. The Court of Appeal has reversed the decision, and has ordered judgment to be entered for the dog-owner. Animals, said Lord Justice Scrutton, may be divided into two classes. There are the wild animals, like tigers and gorillas, which are likely to be dangerous in themselves; a man taking out such an animal is responsible for the damage which it does. In the second class come the animals like dogs and cats, which are ordinarily kept in comparative freedom. There is no obligation to keep the latter class under control; unless the owner is aware that the dog or cat has some vicious tendency, he is not liable for the damage it may do. This particular Airedale terrier, as Mr. Justice Talbot had said, had a hitherto blameless character; the owner therefore was not responsible for the accident. Hundreds of people, said Lord Justice Scrutton, leave dogs in motor-cars, and nobody had ever heard of such an accident before. The defendant left his car with an apparently perfectly well-behaved dog inside; something then happened which had never happened before. This was not negligence; there was no evidence on which the jury could find for the plaintiff.—*The Lancet*, 1930, **2**: 1258.

Abstracts from Current Literature

MEDICINE

Remarks on the Pathogenesis of Graves' Disease. Marine, D., *Am. J. M. Sci.*, 1930, **180**: 767.

Marine, an eminent authority on the thyroid gland, advises the elimination of such indefinite terms as thyrotoxicosis, toxic adenoma, adenomatous goitre with hyperthyroidism, and a host of others, and suggests a more simple and accurate classification He would divide Graves' disease into acute and chronic forms and divide each of these headings into complete and incomplete types. It is his belief that the cause of hyperthyroidism lies without the thyroid gland and therefore surgery which aims at removal of a portion of that gland, is not rational therapy, though he cannot suggest a better.

In support of his contention the author points out some very interesting facts bearing upon the pathological anatomy and etiology of the disease. He holds the view that the anatomical changes in the thyroid gland are constant though not specific. Thus hyperplasia of some degree occurs eventually in all cases, if not inhibited by iodine or some other means. The configuration of this hyperplasia is determined largely by differences of blood supply. At points where the latter is good the hyperplastic process will be most marked. Hyperplasia begins as a result of a fall of the iodine content of the gland below the critical level, and involution to the colloid state at once occurs when the iodine store again rises.

One of the most important features of the pathological anatomy of Graves' disease is the hyperplasia of the lymphoblastic tissues such as the thymus, the spleen, and the regional lymph nodes. Atrophy of the suprarenal cortex occurs in a great proportion of all cases, and is a change of fundamental importance. It has been observed, experimentally, that removal of the thyroid gland hastens thymus atrophy, while removal of the suprarenals causes regeneration of the thymus and status lymphaticus. It would therefore seem that the adrenals are antagonistic to the thyroid in their action, and that the adenoid and thymus hyperplasia in Graves' disease represents a compensatory mechanism opposed to the overactivity of the thyroid.

The facts which support the theory that Graves' disease is in part due to suprarenal cortex and gonad dysfunction may be briefly summarized as follows. (1) The disease is most common at puberty and at the decline of sexual function, the menopause, or a corresponding period in men. (2) Sublethal injury to the suprarenal cortex in the rabbit or cat produces a syndrome closely resembling Graves's disease. It is characterized by increased metabolism, myasthenia, increased appetite, increased irritability, and regeneration of lymph nodes and thymus. (3) A normal physiological change in infants closely resembles this experimental suprarenal injury. In new-born infants involution of the hypertrophic cortex of the suprarenal gland goes hand in hand with a rapid increase in metabolism—an increase of about 16 per cent. This suggests that the hypertrophic suprarenal cortex during intrauterine life controls or inhibits the rate of tissue oxidation which after birth involutes in order to increase heat production. (4) Graves' disease has been successfully treated by means of a fresh glycerine emulsion of suprarenal cortex of the ox.

These facts suggest that the cortex of the suprarenal gland is antagonistic to the thyroid. Deficiency in suprarenal cortex actively provides a means of promoting tissue oxidation, or fails to regulate these oxidative processes, an outstanding manifestation of Graves' disease. As a result of this loss of control over the processes of oxidation in the body there occurs a physiological attempt towards compensation by an increased production of the thyroid hormone. Partial thyroidectomy is therefore not rational therapy.

E. S. MILLS

Epituberculosis. Goldberg, B., and Gasul, B. M., *Am. J. M. Sci.*, 1930, **180**: 824.

Goldberg and Gasul have observed 10 cases of epituberculosis among 500 tuberculous contacts and controls in a Chicago dispensary during the past two years. The disease is defined as a massive non-specific pulmonary infiltration engrafted on a specific tuberculous soil. The disease occurs in infants and children. The clinical signs are out of all proportion to the symptoms. The constitutional symptoms, including cough, dyspnœa, and fever, come on insidiously and are mild, though a whole lobe may be the site of uniform consolidation. The clinical signs are dullness, increased fremitus and resonance, and bronchial breathing without râles. Tuberculin tests are strongly positive, but tubercle bacilli have never been found in the sputum. Most cases have shown caseous or calcified hilus glands and, rarely, a tuberculous focus in the lung itself. Autopsies on rare fatal cases have in some instances shown a non-specific collateral inflammation, in others a large atelectatic area, and in still others the

infiltrate may be of a definite tuberculous structure, though it rarely goes on to caseation and cavitation. Resolution invariably takes place though slowly over months or even years.

The first case reported by the authors is that of a coloured lad of six years who came to the clinic in February, 1929, because of poor appetite and slight cough. The findings were slight elevation of temperature, and a frank consolidation of the right upper lobe which was confirmed by x-ray plates. The sputum was negative for tubercle bacilli, but the tuberculin test was strongly positive. After three months, dullness and bronchial breathing began to disappear, and the patient gained weight. In October, 1929, there was almost complete absorption of the exudate. In January, 1930, another tuberculin test was performed. This was followed by a severe focal and general reaction with complete consolidation of the entire right lung. After many months this consolidation showed areas of absorption and the patient was clinically much improved. There were no deaths in the authors' ten cases. They feel that the inflammatory process is non-tuberculous, though it is intimately associated with the reactions of the tubercle bacillus or its toxins.

E. S. MILLS

Habituelle und infektiöse Aphthen. (Habitual and infectious aphthæ). Flusser, E., *Münch. med. Wchnschr.*, 1930, **77**: 1483.

According to Flusser, the term "aphthæ," or "stomatitis aphthosa," up to the present has connoted no sharply defined clinical condition, but it is clear that under this designation can be placed at least two characteristic conditions that differ one from the other—infectious and habitual aphthæ. The first named is preëminently an infection of early infancy, which is characterized by the appearance of numerous, round, sharply defined erosions, covered with fibrin, on the anterior portion of the buccal cavity. The affection is highly contagious and one attack as a rule confers immunity.

The habitual form is characterized by the formation of little ulcers which appear at intervals of weeks or months, and persist in this way for years. .The ulcers appear singly, rarely more than one at a time, on the mucous membrane of the mouth, generally at the folds. They are irregular in outline, often with undermined edges, and produce no constitutional disturbance. They are not contagious. Stomatitis is slight.

Infectious aphthæ are found in infants, rarely in adults; habitual aphthæ are rare in children. When habitual aphthæ occur in childhood, the first attack and the first relapse are accompanied by severe stomatitis and slight fever, and thus can be confused with the infectious form. In the treatment of the infectious form one or two intracutaneous injections of "aolan," milk, or other protein will have a good effect, while local applications do more harm than good.

A. G. NICHOLLS

Valvular Defect in Relation to Varicosis. Warwick, W. T., *The Lancet*, Dec. 13, 1930, **2**: 1278.

The author investigates the valvular mechanism of the venous return from the lower limbs by means of injection of opaque fluid and subsequent radiographic studies in cadavers of apparently normal subjects showing no evidence of existing varicosities. In such subjects it is found that there is a great variation in the competence of the valve mechanism of the lower limb veins, a certain number showing definite defects in valvular efficiency of one or another group of veins. It is concluded from pressure tests applied to the various systems that these defective veins are potentially varicose, and their possessors are the patients who, in the presence of certain exciting factors, demonstrate clinical varicosity. These exciting factors may be, lack of tone of supporting muscles, long periods of standing, tight elastic bands, pregnancy, venous obstruction in the abdomen, increased intra-abdominal pressure, or heart failure, all superimposed upon the congenital valve weakness or defect. The grouping or distribution of these defects places the patient in one or other of four classes: (1) congenitally varicose internal saphenous type; (2) congenitally varicose external saphenous type; (3) congenitally varicose deep vein type; in addition to which is the normal or congenitally non-varicose type. No evidence was found to suggest a congenital lack of tone of the vein wall. It is pointed out that in addition to the obliteration of the damaged vein successful therapy requires an investigation and correction of the particular exciting factor in each case.

J. B. ROSS

SURGERY

Evidence shown in Roentgenograms of Changes in the Vascular Tree following Experimental Sympathetic Ganglionectomy. Horton, B. T., and Craig, W. McK., *Arch. Surg.*, 1930, **21**: 698.

Physiological observations have shown that the constant changes which follow sympathetic ganglionectomy and ramisectomy may be attributed clinically to the increased flow of blood to the extremities. The authors have endeavoured to place these facts on an anatomical basis, by studying the experimental results on animals of lumbar sympathetic ganglionectomy and ramisectomy, so that

clearer conceptions might be obtained of the clinical results in Raynaud's disease, thromboangiitis obliterans and polyarthritis. An opaque medium was injected into the arterial tree of dogs, after operation. This was followed by x-ray examination. Adson's technique was used. By this method there is a transabdominal exposure of the lumbar sympathetic ganglion; owing to the fact that the ganglia are farther apart in the dog than in man, only the second and third lumbar ganglia and the connecting rami were resected.

Experiments were carried out on one dog to prove the relative value of periarterial sympathetic neurectomy and lumbar sympathetic ganglionectomy and ramisectomy. The authors conclude that in dogs there are definite evidences of vasodilatation in the arterial tree of the hind extremity after interruption of sympathetic innervation by lumbar sympathetic ganglionectomy and ramisectomy. Following periarterial sympathetic neurectomy no changes in the arterial tree were observed. Clinical observations made at the Mayo Clinic on man are in accord with these observations.

G. E. LEARMONTH

Tubercle-like Structures in Human Goitres. Jaffé, R. H., *Arch. Surg.*, 1930, **21**: 717.

Small nodules composed of epithelioid cells and giant cells are occasionally found during the routine microscopic examination of sections from goitrous thyroid glands removed at operation. These nodules have a morphological similarity to miliary tubercles and are usually regarded as such. In miliary tuberculosis the thyroid gland frequently is the site of tubercles which do not differ from the tubercles in other organs, apart from the fact that tubercle bacilli are scanty. In the chronic types of tuberculosis the thyroid gland is rarely affected. It is generally stated that the goitrous tubercles are situated in the stroma and in the follicles. These tubercles consist of epithelioid cells which are often surrounded by a zone of lymphocytes. Giant cells of the Langhans' type are present. It is of rare occurrence to find caseation present. There is a dense surrounding fibrosis about the nodules which gives a firmness to the gland which simulates malignancy.

Jaffé cites three cases of a nodose type and one a diffuse type of goitre, in which the histological pictures were identical with those of a benign, sclerosing form of tuberculosis of the thyroid gland. He was unable to find any acid-fast bacilli. The demonstration of acid-fast bacilli is of prime importance. In none of the cases presented was there evidence of tuberculosis elsewhere in the body. The author believes that the epithelioid cells and giant cells are of epithelial origin and are not derived from the histiocytic elements of the stroma. He advances the view that the fully developed nodules are the result of a noninflammatory swelling, degeneration and desquamation of the follicular epithelium, that is followed by the ingrowth of fibrillar connective tissue.

Clinically patients with these nodules may develop severe symptoms of exophthalmic goitre, or a moderate or slight hyperthyroidism, or no toxic symptoms at all.

G. E. LEARMONTH

The Neuro-Muscular Obstructions of the Gastro-Intestinal Tract. Walton, A. J., *The Lancet*, 1930, **2**: 1331.

Mr. Walton gives a brief summary of the physiological actions of the vagus and the sympathetic nerve fibres as related to the intestinal movements. Under the paralysis of both systems he discusses the etiology and pathology of acute dilatation of the stomach and ileus paralyticus. He suggests that these conditions are becoming rare as the post-operative treatment swings more to the use of morphia than to aperients. He is a great believer in the administration of suprarenal extract for slight dilatations of the stomach. He gives one dram of commercial extract of 1-1,000 with one dram of water every hour for six doses. He suggests that eserine sulphate hypodermically will have an equally good effect.

Under the heading of relative paralysis of all vagal impulses he describes the general characters of visceroptosis. As these patients are subject to spasms, often in the body of the stomach or at the pylorus, he prescribes belladonna or eserine. He mentions the division of the sympathetic fibres in the lesser omentum. Also, under the heading of relative paralysis of all vagal impulses he discusses duodenal ileus, enterospasm and colonic spasm. In one of his eight cases of duodenal ileus there was a line of superficial ulceration caused by the mesenteric vessels. He suggests that very few of these cases are relieved by duodeno-jejunostomy. Under the heading of relative paralysis of the vagal impulses to the sphincters he discusses cardiospasm, or achalasia of the cardia, pylorospasm, and idiopathic dilatation of the colon, *i.e.*, Hirschsprung's disease. He believes that cardiospasm is often a congenital fault. He points out that the cardiac sphincter shows no hypertrophy, a point on which Hurst lays great stress in his argument that the condition is a failure of the sphincter to relax rather than to go into spasm. Walton, however, points out that he knows of no condition of proved spasm of involuntary muscle which is associated with hypertrophy. Hurst supports the findings of Kraus that there is a degenerative change in the vagus and he was able to demonstrate such a lesion in 11 cases which were examined. In 33 of Walton's cases of cardiospasm there were 14 in which dilatation

failed to produce a cure. He has found digital dilatation from below of great benefit and to be successful when dilatation by bougies had failed. He believes that pylorospasm is a congenital deformity, and is not in any sense of the word a neuro-muscular lesion.

On the etiology of Hirschsprung's disease he offers no new theories. The treatment is an ileocolostomy, or a partial or complete colostomy. He mentions the work of Royle in which lumbar ramisection is advised. Wade reported 14 cases of lumbar ramisection with striking improvement in all but one.

W. L. GRAHAM

The Operative Treatment of Lesions of the Lower Extremities in Diabetes Mellitus. McKittrick, L. S., and Pratt, T. C., *Arch. Surg.*, 1930, **21**: 555.

This report covers a seven-year period at the New England Deaconess Hospital, Boston, during which time 281 operations were performed on the lower extremities of patients with diabetes mellitus. These patients were taken care of medically by Dr. E. P. Joslin and his associates throughout the course of the treatment. It was the privilege of the internist to question the surgical progress of the patient if the response to diabetic treatment was other than expected; a persistent high level of the blood sugar, or an unusual resistance to insulin, frequently being the first sign of sepsis in an amputation stump or of undrained pus in the foot. The duty of the internist was also to make operation as safe as possible at any time it was indicated, and subsequently to safeguard the patient from coma or hypoglycæmia.

The classification of cases has been the one suggested by Coller and Marsh, and the given lesion is either due primarily to infection or to arterial insufficiency with or without infection. Local operations in the former group are often successful, while in the latter they are rarely successful and frequently dangerous.

The *S. albus* is probably the most important single organism and infection of this type may produce a fatal septicæmia. The *B. Welchii* is sometimes the causative organism and cases of this type of infection have been reported, though the authors have assumed that such infections are contaminations from the skin, probably introduced at the time of operation, unless there was a proved gas bacillus infection before operation.

A very careful estimate of the patient's condition must be made before operative procedures are attempted. The spectre of septicæmia looms large in every patient afflicted with diabetes and infection in the foot. Where infections are present the authors have found Dakin's solution most satisfactory, and the wounds are kept constantly wet. Indications for operation and the selection of the type of operation are discussed. For stimulation of the circulation the passive exercises of Buerger have been found of value. Of the 281 operations performed, representing 231 separate conditions, the mortality was 11.6 per cent. The mortality in 119 major operations was 17.6 per cent, and in 19 amputations for conditions primarily due to infection was 10.5 per cent, a combined mortality of 16.6 per cent. The authors favour the use of spinal anæsthesia.

G. E. LEARMONTH

Radium Treatment of Buccal Carcinoma. Birkett, G. E., *Brit. M. J.*, 1930, **2**: 947.

Squamous epitheliomata of the mouth and tongue are radio-sensitive, some more so than others. Radium is best applied in the form of needles. Over-treatment, rather than under-treatment, is advisable. The treatment is a conservative one and if successful restores function almost to normal. Local recurrence is rare after six months. The author's attitude is summarized as follows:

If no glands are palpable, observation at monthly intervals. If glands are palpable and removable, block dissection, either combined with implantation of radium or followed by external distance irradiation. If the glands are fixed, implantation of a large number of needles, 30 to 40, after thorough exposure of the neck. Successful treatment requires as an essential early diagnosis.

STUART D. GORDON

Post-Operative Parotiditis: Treatment with and without Radium, Rankin, F. W., and Palmer, B. M., *Ann. of Surg.*, 1930, **92**: 1007.

The incidence of this complication is relatively low, varying in published series from 1 in 3,600 to 1 in 2,275. It appears to occur more frequently after operation on the colon, occurring on an average of once in 135 cases at the Mayo Clinic.

Five theories are held as to its cause: (1) it is a pyæmic phenomenon; (2) a degeneration following hyperyrexia; (3) due to an attempt at toxin excretion; (4) sympathetically produced secondary to operation on the generative organs; (5) due to direct extension along Stenson's duct. Claisal and Dujore, as a result of experimental work, showed that there were four abnormal conditions needed, *viz.*, virulent micro-organisms must be present at the orifice of the parotid duct; the general vitality of the subject must be reduced; the quantity of secretion passing down the duct must be lessened; the quantity and the quality of the saliva secreted must be lowered. Once suppuration has developed, drainage should be instituted. Definite fluctuation should always be waited for before incising. Hot fomentations or cold applications may prevent the formation

of pus. Occasionally drainage may occur through Stenson's duct.

In a series of 58 cases in which radium was not used, 23 deaths occurred; 24 of these 58 were drained, and of these 14 died. Of 20 cases treated with radium 4 died, 2 of them dying some time after the parotiditis had subsided, from other conditions. Elimination of a third death because of an associated infection results in a mortality rate of 5 per cent in the cases radiated. The dosage of radium varied from 800 to 6,605 milligram-hours. Radium was applied the instant swelling was noted in the parotid region. It must be noted that in many cases death was due to the primary lesion or to some major complication of it. The more serious the operation the more unhappy is the prognosis when post-operative parotiditis develops.

STUART D. GORDON

Hereditary Deforming Chondrodysplasia. Hyndman, O. R., *Arch. Surg.*, July, 1930, **21**: 12.

This disease entity has also been referred to as multiple cartilaginous exostosis. Hyndman outlines three aspects of the disease: (1) a brief study, as represented by a case reported in this paper, including the hereditary and familial features; (2) a consideration of the changes that occurred in one of the tumours and that suggested malignancy; (3) a comparative study of this disease with chondrodystrophia fetalis. This disease is hereditary and familial and has been traced in several instances through five generations. Both males and females may transmit the disease. Contrary to other expressed opinions, the author does not consider rickets to be an etiological factor, but that cartilage rests are left in the wake of a chaotic advancing epiphysis, and these rests undoubtedly form the nucleus of the anomalous benign tumours. The disease may manifest itself in any of the bones formed from cartilage, but not in intramembranous bones. The growths have been reported as present at birth and appearing as late in life as the age of fifty years. The tumour itself varies in its content of bone, but is practically always less dense than the adjacent normal bone. If it is centrally located, it expands the cortex. The x-ray appearance is that of the "lace curtain" effect or "foam like" structure, resembling in some ways the giant cell tumour of bone. Delicate bony septa encase the less dense cartilaginous tissue. These tumours may attain an enormous size, yet in an x-ray they present only in rare instances an appearance that is the least suggestive of malignancy, such as is found in sarcoma of the bone. The author presents the history of a case in a man 48 years of age; the disease had been present in three generations of his family on the male side.

G. E. LEARMONTH

OBSTETRICS AND GYNÆCOLOGY

The Hydrogen-Ion Concentration of the Blood in Eclampsia. Stander, H. J., and Eastman, N. J., *Am. J. Obs. & Gyn.*, 1930, **20**: 822.

Immediately after an eclamptic convulsion, the hydrogen-ion concentration of the blood usually increases, and often to the level of a true acidosis. Usually the eclamptic patient overcomes this by such means as lowering the carbonic acid through deepened breathing, with the result that the periods of acidosis following convulsions are transitory. When the patient is unable to overcome the acidosis, death may result unless anti-acidosis treatment be instituted. The CO_2-combining power of the blood is a fairly good index of the acid-base equilibrium, and should be closely followed in all eclamptic patients, when laboratory facilities are available. From previous work on lactic and other organic acids in the blood of eclamptic patients, it is probable that these periods of acidosis result from accumulation of these acids following the muscular work incident to the convulsion.

ROSS MITCHELL

A Survey of Causative Factors in Sterility. Meaker, S. R., *Am. J. Obs. & Gyn.*, 1930, **20**: 749.

The older idea, that the sterility of a mating is ordinarily due to some single abnormal condition, has led in the past to incomplete investigation, inadequate treatment, and generally unsatisfactory results. Modern research shows that sterility is commonly due to the combined influence of multiple causative factors. In the series of cases studied the average number of factors per case was between four and five. Any single one of the multiple causative factors, excepting the comparatively few absolute factors, may not be sufficient to cause sterility; all of them together depress fertility below the threshold of conception. About one-third of all demonstrable causative factors are extra-genital conditions of constitutional depression, *e.g.*, protein-starvation, which lower the inherent fertility of the gametes. Such conditions are operative in one or both partners in nearly 90 per cent of sterile matings. In the male they are, in the aggregate, more important than abnormal local conditions. About one-third of all demonstrable causative factors are on the male side, and two-thirds on the female side. In more than 90 per cent of clinical cases, however, there is some division of responsibility between the two partners. A radical revision of older ideas of causation requires the establishment of new standards for the complete diagnostic study of the sterile mating. Complete investigation points the way to adequate treatment.

ROSS MITCHELL

UROLOGY

Ureteral Calculi. Pugh, W. S., *Med. J. & Rec.*, 1930, **131**: 548 and 608.

An analysis of some 200 cases of renal and ureteral calculi showed that infection plus interference with urinary flow could be demonstrated in nearly every one. They are, then, products of obstructive lesions, and, once formed, they themselves cause further obstruction.

When a calculus becomes impacted in the ureter there is a gradual accumulation of a round-cell infiltrate into all the layers of its wall. This may be called a chronic interstitial ureteritis and it is not always limited to the immediate area of the stone. This infiltration may become very dense and sufficiently opaque to the x-ray to give an erroneous conception as to the size of the stone. Dilatation above the site of impaction does not usually occur unless the obstruction be complete, and this is not usually the case. When the stone is in the lower ureter the orifice becomes œdematous and pouting, giving a characteristic cystoscopic appearance.

Nausea, vomiting, hæmaturia and pain are the classical signs, with frequency and urgency when the stone is in the lower ureter, but it must be remembered that identical symptoms may be produced by many other genito-urinary affections, and indeed by gastro-intestinal and pelvic conditions and it may be quite impossible to make a diagnosis even with the most exact history and physical examination. All such cases can only be properly worked out by kidney function tests, cystoscopy, ureteral catheterization and pyelography. Stones may become impacted anywhere, but the lower third of the ureter is by far the most common site. About 80 per cent of calculi show in a plain x-ray and this should always be taken with the ureteral catheter in position. By tilting the x-ray tube, taking two exposures, and comparing the relation of the shadows to the opaque catheter the proof becomes conclusive.

The treatment of election is progressive dilatation. This is carried out by the use of bougies and dilating bags and can easily be continued up to 20 Charrière. No hard and fast rule can be laid down as to when dilatation must be abandoned and ureterotomy carried out. With care and patience a very large number of these stones may be made to pass, but if repeated dilatation and constant attention is not feasible, if there is marked obstruction, or if infection becomes superadded, open operation must be resorted to.

N. E. BERRY

Indications for and Results of Conservative Operations on the Kidney. Walters, W. J., *J. Am. M. Ass.*, 1930, **95**: 1335.

Conservative operations in hydronephrosis are first presented. A case is reported in which there was a bilateral infected hydronephrosis, the pelves containing as much as 350 c.c. Bilateral resection of the renal pelves was carried out and 18 months after the second operation the patient was well, had gained 20 pounds, and neither kidney contained pus or residual urine. A similar operation had been successfully carried out on the one side in three other cases. In many cases of hydronephrosis obstructing bands or anomalous vessels may be found and division of these may suffice. Similarly, in cases of obstruction due to stones in the lower ureter the ureter may be greatly dilated with resulting hydronephrosis and infection, and yet following removal of the calculus and relief of the obstruction the kidney may return almost to normal.

Conservative treatment of stones in the renal pelvis is recommended at all times, even though they be large and multiple. Experience at the Mayo Clinic has shown that stones reform in the kidney only rarely, provided they are cleanly removed and there is satisfactory drainage. X-ray or fluoroscopic examination at the time of operation is the only certain method of determining the completeness of their removal. Such conservative treatment is absolutely essential in cases of bilateral disease and if properly carried out the kidney, though very seriously injured, may show remarkable restoration of function. One of the most important steps to insure success of the operation is the conversion of the renal pelvis and calyces temporarily from a closed into an open cavity by the insertion of a catheter through the cortex following removal of the stone.

N. E. BERRY

OPHTHALMOLOGY

Prowazek's Inclusions in Trachoma. Wolchonsky, S., *Klin. M. f. Augenh.*, 1930, **5**: 544.

This is a report of 240 cases examined, in 220 of which the trachomatous conjunctiva was scraped, and a negative result for inclusions was found only in 8 cases. The author considers the finding of inclusions in an inflamed conjunctiva as pathognomonic of trachoma.

S. HANFORD MCKEE

Inclusion Bodies in artificially induced Conjunctivitis. Gifford, S. R., and Lazar, N. K., *Arch. of Ophth.*, Oct. 1930, **4**: 468.

Since the description by Halberstaedter and Prowazek, in 1907, of peculiar bodies in the epithelial cells in cases of trachoma, an intensive literature has grown up on the question of the etiological relation of these bodies to

this disease. Halberstaedter believed they represented a living parasite, the cause of trachoma, and called them *Chlamydozoa*, or "mantle protozoans." Similar bodies were found in other diseases of unknown origin, as in scarlet fever by Mallory, and in varicella by Gins. Evidence casting doubt on the specificity of these bodies soon appeared. Stargardt and Heymann reported finding identical bodies in conjunctivitis of the new-born, both with and without gonococci. The inclusion bodies were then found in a number of conditions other than trachoma. Roemer found them in follicular conjunctivitis; Thierfelder, Botteri and Lodato in vernal conjunctivitis, and Axenfeld in diplobacillary conjunctivitis. McKee found inclusions on the conjunctiva of two normal infants, which he was unable to distinguish from similar bodies found in trachoma. Wolbach and McKee studied material from ten cases of trachoma in sections and compared it with material from other mucous membranes. They found identical inclusions in all these tissues. Axenfeld, while sceptical of some of these observations, seemed more convinced by McKee's observations, and suggested the possibility of carriers of inclusions, comparable to typhoid carriers. An attempt was now made by the writers to determine whether typical inclusions could be found in material from artificially induced inflammation of the conjunctiva. Organisms from sources entirely independent of trachoma or inclusion blennorrhœa and chemical irritants were used. As chemical irritants, nicotine in 25 per cent aqueous solution and pure croton oil were instilled into the conjunctival sac of rabbits and guinea pigs. The nicotine produced a well marked chemosis, followed by a conjunctivitis lasting several weeks. Epithelial scrapings were made daily, and later at intervals, and Giemsa and Linder's contrast stain were used.

They conclude as follows. It was possible by producing a conjunctivitis in animals with two chemical agents and an organism obtained from a source independent of trachoma and "inclusion-blenorrhea" to obtain material showing typical inclusion-bodies. The inclusions produced by these agents were identical in morphology and staining reaction. The fact that such inclusions were produced by chemical agents is proof that they do not represent degenerated bacteria, as was suggested by Bengston and others. Such inclusions were identical in morphology and staining reactions with those found in trachoma and "inclusion-blenorrhea". The only conclusion that can be drawn from this work is that such inclusions are produced by inflammation of the conjunctiva, with swelling and lymphoid hyperplasia.

S. HANFORD MCKEE

Contribution to Trachoma Research (Inclusion Infection, Inclusion Blennorrhea, Swimming-pool Conjunctivitis, and their relation to each other). Aust, O., *Græfe's Arch.*, 1929, **5**: 93.

This consists in a review of 17 cases of conjunctivitis, in all of which inclusion bodies were found. They were all similar to acute granular conjunctivitis, except that scarring did not take place in any of them. Aust believes that this form of acute conjunctivitis, or acute trachoma, is always derived from a genital source, and in such cases he has never seen cicatricial changes. Inclusion disease of the genitals cannot be recognized clinically. Mixed infections of the conjunctiva from inclusion bodies and gonococci do occur, though the incubation periods differ and in consequence inclusion bodies are not usually found until a later examination. These mixed infections can be explained only by the presence in the mother's genitals of both infecting agents. Among 31 cases of swimming-pool conjunctivitis Aust found cell inclusions in 4. He points out that the inclusion cases did not differ clinically from the non-inclusion cases, except that the average duration of the disease in the inclusion cases was 10 to 13 months, while in the others it was only 4 to 6 weeks. It is never followed by cicatrization in the conjunctiva, is caused by various infecting agents, and, where the inclusion bodies are present, Aust believes the infection to be from a genital source.

S. HANFORD MCKEE

Pigmentary Degeneration of the Retina in Cerebrospinal Syphilis. Friedenwald, J. S., *Am. J. of Ophthal.*, 1930, **13**: 943.

The occurrence of the ophthalmoscopic picture of retinitis pigmentosa as the result of a diffuse chorioretinitis in congenital syphilis is well known. In acquired syphilis this condition is much less common, but its occurrence has been well recognized since the classical description by Forster. The latter however gave no data as to the nature of the syphilitic disease in the patients, though he pointed out that diffuse chorioretinitis generally occurs late in the syphilitic infection, and is never associated with the primary or secondary stages. To the 2 cases reported by Foster, Friedenwald adds 3 more, one of which is as follows. Mr. A., 48 years old, was seen in February, 1926, complaining of failing vision, loss of weight and depression. Five months previously the diagnosis of tabes with optic atrophy had been made. Blood and spinal fluid Wassermann tests were positive. He had received a course of salvarsan and bismuth and had improved markedly. There was no history of familial lues, nor of retinitis pigmentosa, nor of a primary lesion. No night blindness.

Examination showed ptosis of the right lid, pupils dilated, irregular, and unequal, not reacting to light, but slightly to convergence. Vision of right eye zero; left 20/30. Ophthalmoscopic examination showed both discs to be pale, the right more than the left, disc margins irregular, retinal arteries markedly attenuated. Scattered throughout both fundi were numerous irregular masses of pigment, some of typical crescentic form, overlying the blood vessels. In addition, there was a great deal of fine pigment peppering, and numerous small white dots. There was slight analgesia about the nose, slight deafness in one ear, absence of knee- and ankle-jerk, loss of sense of position in the legs, a fairly typical tabetic gait, a positive Romberg test, and a slight tremor of the head and hands. The man was given a vigorous course of antiluetic treatment, but apart from a decrease in the amount of retinal pigment, the condition remained about the same.

The cases are of interest in that they present a type of optic atrophy associated with tabe which is favourably influenced by treatment. The association of the ophthalmoscopic lesion which is usually characteristic of congenital lues with tabes and paresis in acquired lues indicates that the nature of the bodily reactions (allergy and immunity) to the spirochete in late neurosyphilis resembles that found in congenital lues. Finally, it is of special interest to note that under treatment the amount of retinal pigmentation in these cases shows a decided decrease. We must conclude then that once the invasion of the pigment into the retina has been stopped, the normal processes of transport and repair tend to remove the pigment which has already been laid down in the retina.

S. HANFORD MCKEE

NEUROLOGY AND PSYCHIATRY

The Malaria Treatment of Neurosyphilis. Bahr, M. A., Prenatt, F., DeArmond, A. M., Clark, C. P., and Bruetsch, W. L., *Indianapolis Med. J.*, Dec. 1930, **33**: 12, 731.

We here review a symposium on five years' experience with the malaria treatment of neurosyphilis, presented before the Indianapolis Medical Society by members of the staff of the Central Indiana State Hospital, where, it is claimed, this treatment has been carried on for a longer period than in any other American hospital. Bahr states that of 240 cases of paresis, 29 per cent have been discharged as "recovered", *i.e.*, they have been able to return to their former occupations, show a minimal degree of intellectual defect, and have complete insight into the nature of the disease. The great majority of patients are found to be well advanced in the second or even in the third stage of the disease on admission to this hospital, but those selected for the treatment were chosen "more or less indiscriminately", so that much better results might be expected from treatment commenced in the incipient stage. The treatment is easily controlled, but should be restricted to hospitalized patients. The most satisfactory time to take blood for inoculation is just before the chill is expected. Inoculated malaria is very sensitive to quinine, and cannot be transmitted by flies or mosquitos, so the treatment is not attended with danger to the public.

Prenatt presents an analysis of the outcome of the first hundred cases treated (1925 to 1927), and compares the results with a hundred cases treated by tryparsamide in the same period but at another hospital. Prenatt reports 25 patients discharged as recovered, 4 fit to leave hospital if a favourable environment were to be found, 4 remaining in hospital where they are good workers, 24 unimproved; the others (43) are dead. The tryparsamide results are as follows: cured, 5; improved, 40 (15 have left hospital); unimproved, 34; dead, 21.

DeArmond deals with the serological outcome of the first hundred cases, reporting improvement in this respect in the majority of cases. The serological improvement, when it occurs, follows clinical remission. Reduced cell count is the first improvement manifested. A completely negative globulin reaction is not the rule. The intensity of the gold curve is reduced by a gradual flattening. Two years or more elapse before the Wassermann reaction becomes negative.

Clark's contribution is that of an ophthalmologist. He reports observations on 50 patients. Six patients with unilateral Argyll-Robertson pupils, and 22 out of 28 with bilateral Argyll-Robertson pupils, recovered normally pupillary reactions. This was the outstanding improvement. Clark suggests that malaria-inoculation would be of value in syphilis of the optic nerve or visual pathways.

Bruetsch discusses the mechanism of the malaria treatment. He disagrees with those who attribute the results obtained to the rise in temperature which follows inoculation. "During the malaria treatment specific tissue changes are going on in the body and it would be strange if these changes would not come into action in destroying spirochetes." His study of material from autopsies of patients who died while under the treatment revealed a stimulation of the reticulo-endothelial system leading to new formation of phagocytic tissue in all organs of the body, especially in the liver and spleen where there is normally a large mass of reticulo-endothelial tissue. Histocytes are numerous, particularly in the venous blood of the liver, in the vessels of the mucosa and submucosa of the small intestines and in the septal

vessels of the lungs. They are present in great numbers in the meningeal veins and in lesser numbers in the cortical vessels. It is significant that new formation of macrophagic cells is found in the connective tissues everywhere throughout the body, as spirochætes are found in the connective tissues, and it is known that tissue phagocytes are capable of engulfing spirochætes. A similar, but less marked, stimulation of the reticulo-endothelial apparatus can be induced by typhoid vaccines and various proteins. Doubtless other factors are concerned, but of these we have no definite knowledge as yet.

W. H. HATTIE

Spinal Drainage in Alcoholic Deliria and other Acute Alcoholic Psychoses. Goldsmith, H., *Am. J. of Psych.*, 1930, **10**: 255.

Since the advent of prohibition the increase in the number of admissions for acute alcoholic psychoses, requiring longer hospitalization than in the case of such psychoses of pre-prohibition days, has resulted in serious crowding of cer tain hospitals. (At the Baltimore Psychopathic Hospital, such admissions in the years 1925-27 were four times as many as in the years 1912-14). This urgency seemingly suggested to Goldsmith the desirability of a treatment which would lessen stay in hospital. A procedure which offered relief in certain of the functional and organic conditions seemed to promise help in the case of the alcoholic psychoses, namely, spinal drainage. This procedure would reduce the œdema, congestion, and irritation of the brain structures, to which symptoms of alcoholic poisoning are attributed. During 1928 and 1929 delirium tremens and certain other of the acute alcoholic psychoses were treated by spinal drainage as a regular therapeutic measure. "The results have been so eminently satisfactory, often startling, in the almost immediate remissions produced that it is now being advocated for use in all types of acute alcoholic psychoses."

A special puncture is done within 24 hours after patient's admission to hospital, and from 30 c.c. to 50 c.c. or more of the spinal fluid is removed. In about half the cases the fluid escapes under pressure. If improvement does not follow within 48 hours the operation may be repeated. In approximately 78 per cent of cases complete remissions occurred within three to seven days. No special treatment was required in the greater number of cases; some needed attention to special symptoms. In a few cases affective reactions (of manic-depressive type) appeared, but did not persist. In 78 cases, the average period of hospitalization was 30 days, as compared with 48 days under former methods of treatment. Ten per cent of the patients died in acute alcoholic delirium. In these cases the prognosis was bad from the time of admission.

W. H. HATTIE

Treatment of Sciatica by Epidural Injections. Evans, Wm., *The Lancet*, Dec. 6, 1930, **2**: 1225.

The author gives a preliminary review of the theories of production of sciatic pain, noting that nomenclature and classification are in a state of chaos. Most authors agree in recognizing two distinct types, *viz.*, (1) primary, idiopathic or essential, in which no pressure lesion is demonstrable and the etiology is obscure; (2) secondary or symptomatic, in which pain results from pressure by neoplasms or disease of some of the neighbouring articulations. Contrary to the opinion of many, the author finds that the primary type is the more frequent.

His forty cases were apparently typical cases of unilateral sciatic pain, in which drug treatment, counter irritations, massage, electrotherapy of various kinds, stretching, injection of the nerve and splinting had been ineffectual. He describes in detail the method of intrasacral epidural injection, using sterile normal saline only. The amount, he believes, should not exceed 80 c.c., given at body temperature. The results were highly satisfactory in more than 60 per cent of the cases. About 27 per cent received no benefit. It is believed that a mechanical stretching of the nerve roots that go to form the sciatic nerve is the important factor in the case.

A. T. MATHERS

HYGIENE AND PUBLIC HEALTH

Iodine Prophylaxis and Endemic Goitre. Cameron, A. T., *Canad. Pub. Health J.*, 1930, **21**: 495 and 541.

In this article Cameron presents an admirable review of the work which has been done in associating endemic goitre with iodine deficiency. Minute traces of iodine may now be estimated more accurately than those of any other element, except those detectable by radioactive procedures. Estimations of the urine content of iodine can be taken as an accurate index of the total excretion. If intake is reasonably constant, excretion is also reasonably constant, so the amount excreted gives a clue to the iodine intake. Iodine excretion in non-goitrous persons and, inferentially, iodine intake are definitely greater than in the goitrous. So it may be concluded that there is a close relationship between deficiency of iodine in the diet and the occurrence of simple endemic goitre. Moreover, the physiologically active secretion of the thyroid, an organic iodine compound (thyroxine or a derivative of it), is responsible for a large proportion of the heat production of the body, and

it would seem that deficiency of iodine in the diet may readily lead to such embarrassment of thyroid function as to produce an abnormal condition of the gland.

As pathologists and clinicians are not in agreement in respect of pathological conditions of the thyroid Cameron does not discuss them, but he accepts as probably correct Marine's teaching that a physiological hypertrophy leading to hyperplasia is the initial disturbance produced by either an iodine deficiency or some other strain on thyroid function, and that this, if sufficiently prolonged, leads to a persistent abnormal condition termed "endemic goitre". Certain thyroids exhibit adenomatous areas, potentially dangerous, developing possibly into toxic adenomata and producing symptoms of hyperthyroidism. The reason for this statement will appear presently.

After a rapid review of the earlier applications of iodine to the treatment of goitre, reference is made to the experiences of Marine and Kimball in the schools of Akron, Ohio (1916), and of several others, in which systematic large-scale endeavours to prevent and relieve goitre by the administration of iodine have proved conspicuously successful. Among those referred to is W. D. Keith, who reported his very striking experience in Pemberton Valley, B.C., in this *Journal* in 1924. In this valley a highly goitrous population was entirely cured and further occurrence of goitre prevented by administration of minute doses of iodine.

The claims of McCarrison and others that iodine deficiency alone is insufficient to cause goitre are given consideration, and Cameron is in agreement with this attitude. "Nevertheless, it is almost universally conceded that iodine prophylaxis does lessen the incidence of goitre and benefit the majority of simple goitres." Cameron, therefore, goes on to consider the best method of administering iodine as a prophylactic, the adequate dosage, and the evidence available concerning the potential danger of its administration in the adenomatous goitre of adults.

With reference to administration, note is taken of the possibility of increasing intake by choice of foods, *e.g.*, marine foods, but the iodization of table salt appeals to most investigators as the most practicable method. This is now being done very generally, by the addition of the iodide of either potassium or sodium, but the proportions used in various countries vary widely. In Michigan it is 1:5,000; in Canada, 1:10,000; in Switzerland, 1:200,000; in New Zealand, 1:250,000. Cameron considers that the Swiss and New Zealand proportions are of the right order, but that the absolute optimum has not yet been determined. The Canadian dosage, in his opinion, is much too high. Reference to Kocher's contention that *overdosage* of iodine may induce in a non-toxic goitre a marked hyperthyroid condition is followed by statements from various authorities relative to the effects of small dosage. From these it appears that unfortunate results have followed in a few instances, but the danger is so slight that Cameron would "press for the general use of the best method of prevention, the extended use of iodized salt in all districts where endemic goitre is prevalent—and this applies to a large part of Canada." Compulsory use would produce great good and little harm, but many people object to compulsion, so the suggestion of von Jauregg is applauded: that "all salt sold under usual conditions would be iodized, and non-iodized salt would require to be specially asked for, and perhaps only sold by special vendors (pharmacists)". Legislative enactments might well include regulation of traffic in iodine and thyroid preparations.

W. H. HATTIE

THERAPEUTICS

L'Autosérothérapie dans les Rheumatismes Chroniques. (The Treatment of Chronic Rheumatism with autogenous serum). Le Floch, P., *Presse Méd.*, 1930, **63**: 1061.

The treatment of chronic rheumatism with the patient's own blood serum is no new procedure, but has somewhat undeservedly dropped into the background. The treatment is, of course, not specific, but the etiological agent in any given case of rheumatism is not often to be determined with certainty. Therefore, an agent which can act as a fixative or catalyser may be indicated. The author has treated 153 cases of chronic rheumatism on these lines, of which 20 were completely cured; 34, definitely improved; 23, slightly improved; 21, unimproved; and 2 were made worse. As a guide the blood examination may be taken, though, according to the author, only the leucocyte formula is of importance. When polynuclear leucocytosis is found the classical treatment with autogenous serum is indicated; with mononuclear predominance, the contrary is the case. The rationale of the procedure is by no means obvious. Possibly, it is suggested, the autogenous serum acts like the autogenous whole blood by indirectly stimulating the production of sulphur.

A. G. NICHOLLS

Sulfosin Therapy. Power, T. D., *The Lancet*, Dec. 13, 1930, **2**: 1278.

The results are given of eight months' experience with the use of sulfosin, a preparation of sulphur in oil, as advocated by Schroeder, as a pyrexia-producing agent in the treatment of mental cases, chiefly general paralysis of the insane. No claims or conclusions are put forth

as to its therapeutic value, but attention is directed to its pyrexia-producing properties. As such it has proved far superior to any other preparation in the hands of the author. Pyrexia follows its intramuscular injection within 24 hours and the temperature returns to normal within 72 hours. The height of the fever can be regulated with singular accuracy by the size of the dose and the temperature chart can be made to imitate almost exactly the course of a malarial infection. In addition to the fever there is produced a notable leucocytosis, in one case rising to 31,200, with a relative increase of polymorphonuclear neutrophils. The author concludes that sulphosin is a reliable and easily controlled pyrexia-producing agent, possessing distinct therapeutic possibilities.

J. B. Ross

The Treatment of Sciatica. Evans, W., *The Lancet*, Dec. 6, 1930, **2**: 1225.

The author reports the treatment of 40 cases of idiopathic sciatica by the intrasacral epidural injection of novocain and saline. He emphasizes the necessity of separating the primary from the secondary sciaticas. Of the 40 cases discussed, 21 were males and 19 were females, with an average age of 40 years. He describes the technique of the injection which is that of the commonly called "caudal block." He considers that it is the quantity rather than the nature of the fluid injected which gives the beneficial results. He uses from 60 to 145 c.c. In the majority of cases the first 20 to 30 c.c. consists of 1 per cent novocain and the remainder normal saline. His results show 61 per cent cured and 14 per cent benefited. The duration of these cases had been from 5 days to 18 months. He describes the cause of relief as being due to a stretching of the sciatic nerve trunk or its roots. He has done experimental work which bears this out. Many of the patients experienced pain in the course of the affected nerve during the treatment. Visible stretching of the nerve roots was observed in the cadaver during the injection.

W. L. Graham

RADIOLOGY

Deep Roentgen Ray Therapy of Mammary Carcinoma. Evans, Wm. A., and Leucutia, T., *Am. J. of Roentgenol.*, 1930, **24**: 693.

This article gives a detailed statistical account of five-year results of a series of cases reported in the same Journal in 1925. Interesting tables of results are included. "In estimating percentages, all cases who could not be located were included among the dead. It was also assumed that all patients dead have succumbed from cancer, although in several instances, there was no evidence of carcinoma of any kind at time of death. Thus the statistics should represent the most unfavourable figures under the circumstances." Neverthless, it is stated that short wave roentgen therapy is of considerable aid in the treatment of operable mammary cancer as an auxiliary to surgery. In cases without glandular involvement, the addition of radiation did not seem to noticeably increase the five-year results above those of surgery alone, but in those cases in which the carcinoma had already spread to axillary or high thoracic nodes, the five-year results were nearly doubled. The author decided that the best method of procedure is a combination of radical surgery with a thorough systematic irradiation of the entire anterior thorax, axilla and neck on the diseased side.

A. S. Kirkland

A Further Report on the X-Ray Treatment of Menorrhagia of the Menopause and Uterine Fibroids. Carter, L. J., *Radiology*, 1930, **16**: 44.

Analyzing the results in 100 consecutive cases, Dr. Carter is of the opinion that the treatment of uterine hæmorrhage and uterine fibroids is good for 100 per cent cure, providing that a careful examination has ruled out the possibility of malignancy. It is also stated that it is possible to effect a cure with much less total x-ray dosage than is usually employed. The presence of fibroid changes in the uterus is always a factor requiring increased dosage. Contraindications to the use of radium in this condition comprise all associated pelvic infections, but infection is not a contraindication to the use of x-ray. On the contrary, the infection frequently clears up under the x-ray therapy, other contraindications are: (1) urgent pressure symptoms from a large or incarcerated fibroid; (2) excessive size of a fibroid; (3) the presence of subserous pedunculated fibroids. The x-ray treatment of uterine hæmorrhage in women during the productive period should be avoided if possible. However, successes are reported in such cases with reduced or divided doses. The choice between radium and x-ray is a personal one. The author prefers the x-ray, as with the reduced dosage the treatment becomes a simple office procedure, not involving much loss of time or discomfort or expense to the patient.

A. S. Kirkland

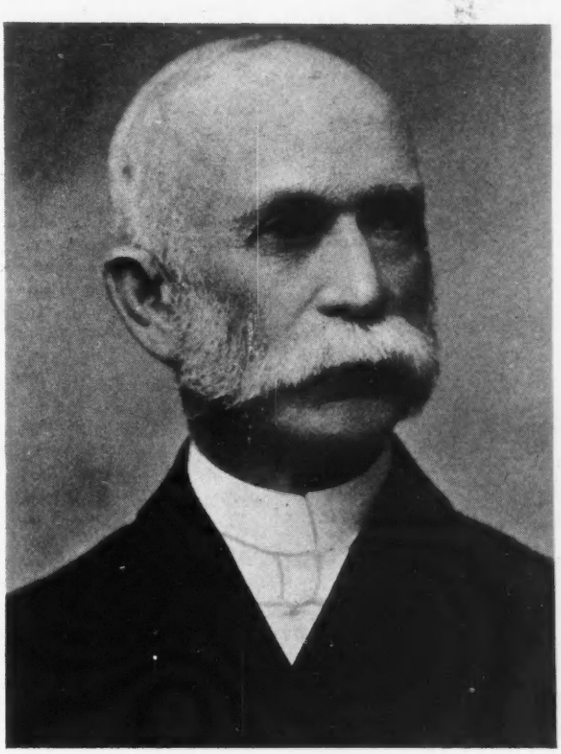
Obituaries

Dr. Tecumseh Kingsley Holmes died at Chatham, Ont., on December 25, 1930, in his ninety-second year. He had been in active practice until a short time before his death.

Dr. Holmes was born in Euphemia Township, in the County of Lambton, on January 17, 1839, the son of Abraham and Jane (Gibson) Holmes. His father was the first white child born in Kent County, his mother being of United Empire Loyalists descent. He was educated in the public schools, the University of Michigan, Long Island College Hospital (M.D., 1865), Columbia College, New York (M.D., 1866), and the Victoria Medical College, Toronto (M.D., 1867). In his early days he taught school in Kent.

On January 23, 1873, he married Miss Mary Elizabeth Taylor, daughter of T. H. Taylor, who was one of the pioneer millers of this section of Ontario.

Dr. Holmes was a pioneer in his chosen profession, and it is well-known that in Kent County, in his early days, he performed serious operations, using methods which were not adopted as a general practice until many years later. He was the first surgeon in Canada to perform trachelorrhaphy in Canada, and was the first to recognize the cause of puerperal mania and to point out the surgical means of curing it. His treatises on various medical subjects were widely read, and he received recognition from many medical societies. At one time he was president of the Canadian Medical Association (1886-87). For many years he practised in partnership with Dr. George T. McKeough.



Dr. Tecumseh Kingsley Holmes

Dr. Holmes was fond of the best in literature and his library is spoken of as one of the finest private collections in Canada. He travelled extensively, visiting the principal countries of Europe several times. He wrote interestingly of his trips, and his contributions to newspapers and periodicals were widely read.

He was not only a strong writer, but at the same time he was an eloquent speaker, whom it was a delight to listen to. Until age prevented him from the same physical activity which he exhibited in his younger days, there was no special occasion of importance in Chatham which was not enhanced by an address from Dr. Holmes. His language was pure and classic; his thoughts were always beautiful and inspiring.

Dr. Holmes was a man of great social tendencies. He enjoyed the association of his friends, and his home was the centre of many a delightful and inspiring season of social intercourse. He was greatly assisted throughout his life in all departments of his great activities by his faithful wife. In 1923 this happy couple celebrated their Golden Wedding which was an occasion for great rejoicing and suitable festivities, when congratulations were received from many points throughout Canada. At that time their family were all gathered for the occasion, and the venerable couple thoroughly enjoyed the wonderful inspiration of the day. Their home was one of culture and refinement, and its influence had a most beneficent effect upon the whole community.

Dr. Holmes had been a man of practically perfect health throughout his entire life, his only illness being an attack of typhoid when he was above seventy years of age and a slight attack of erysipelas a number of years ago. His father before him was a man of powerful physique, passing from this life in the 95th year of his age.

While his body became more frail with the passing of the years, Dr. Holmes' mind and intellect seemed to become even more brilliant and active. He not only retained his faculties of thought and reasoning but he seemed to continue to develop an even greater power for grasping the significance of world affairs, besides probing the most difficult problems of his profession. In spite of dimming eyesight, he continued to exhibit a very active interest in the affairs of state, and right up to the very last, he retained his charming qualities as an entertaining conversationalist upon current events and the trend of public thought.

He was a Liberal in politics and a member of the Anglican communion. Outside of his profession he was interested in many financial ventures, and was a former President of the T. H. Taylor Company and a director of the former Chatham Loan and Savings Company.

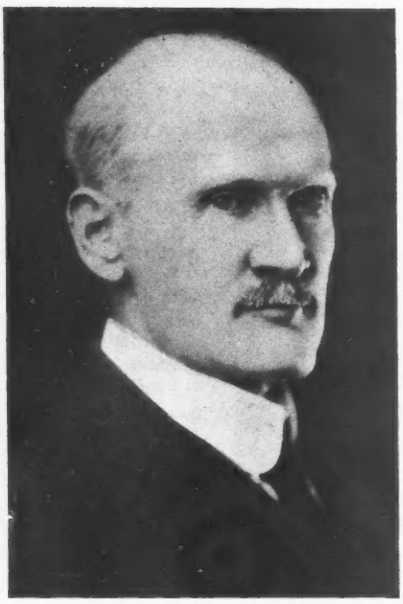
Dr. Holmes is survived by two sons and one daughter Dr. Kingsley H. Holmes who was associated with his father in practice, Dr. Shirley Holmes, eye, ear and nose specialist of Chatham, and Mrs. R. L. Pattinson, also of Chatham. His eldest son, Dr. Garnett Holmes, and his wife predeceased him in 1930.

Dr. Jasper Halpenny, late Professor of Surgery in the University of Manitoba, and Director of the Department of Surgery, Winnipeg General Hospital, died on December 19, 1930, at Winnipeg, at the age of sixty-one. Born at Listowel, Ontario, in 1869, he moved with his parents in 1880 to a farm on Beautiful Plains, one mile west of Neepawa, Manitoba. His first education was obtained in Neepawa and Winnipeg schools; in 1894 he took his B.A. degree from Wesley College, Winnipeg; and in 1900 he graduated from Manitoba Medical College, with the degree of M.D., C.M., and the reputation of being an earnest, hard-working student. After post-graduate work in the Johns Hopkins Hospital he was appointed Medical

Superintendent of the Winnipeg General Hospital. Four years later he resigned that position and was appointed to the staff of the hospital. His evident capacity marked him for rapid advancement, and he rose to be Chief of Surgery. He was also a member of the first staff of Grace Obstetrical Hospital, holding the position of consulting surgeon.

In his early years as a surgeon he obtained much success with his treatment of peritonitis. His experience with typhoid fever, prevalent in Winnipeg during the first decade of his medical career, led him to write a paper on "The typhoid spine," which he read before the International Medical Congress at Budapest in 1909.

The list of offices held by him is evidence of his



Dr. Jasper Halpenny

public spirit and his capacity for organization: President of the Winnipeg Medico-Chirurgical Society; the first Secretary, and, later, President, of the Manitoba Medical Association; member of the Executive of the Canadian Medical Association; member of the Medical Faculty Council and of the University Council; charter member of the American College of Surgeons; member of the Board of Regents of that College, and, in 1915, Vice-president. During the war he was Commanding Officer of the C.O.T.C. in the University of Manitoba. He showed his interest in university sport by presenting the Halpenny Cup for competition in hockey between the western Canadian universities. For his motto he might have taken "*Nihil humani a me alienum puto*". There was no phase of social betterment in which he was not interested, and few in which he did not take an active part. Provincial registration of nurses, medical inspection of school children, social hygiene, and medical education were only some of the problems to which he made large contributions. Like Alan Breck, he was a "bonny fighter," and, once convinced of the worth of a cause, he was not readily silenced.

These incessant activities broke down his health in 1925, and he took up farming at Harlington, Texas. A few weeks ago he returned to the west and contracted pneumonia, which proved fatal. He is survived by three sons and his widow, daughter of the late Hon. Corydon Brown, formerly Minister of Agriculture in Manitoba.

In collaboration with his wife he produced a work on hygiene, "How to be Healthy," which was used as a text-book in western schools. To various medical and scientific journals he contributed numerous papers. His rather frail body contained an eager ardent spirit which constrained him to "shun delights and live laborious days".

ROSS MITCHELL

AN APPRECIATION

Dr. Jasper Halpenny was for many years one of the leaders of the second generation of medical men in western Canada. Of the many interests that claimed his attention medical education occupied probably first place. For nearly a quarter of a century he exerted great influence in shaping the policies of Manitoba Medical College. Especially was his organizing ability in demand about the time that the medical school became a part of the University of Manitoba. As the first Professor of Surgery in the reorganized medical school he not only was the directing mind in his own department, but his comprehensive knowledge of the problems of medical education made him a most valued member of the faculty council for many years. As a clinician and teacher he ranked very high, and a large number of the younger practitioners in western Canada will always hold him in the highest esteem. His loyalty to any good cause in which he was interested, his tireless energy, and unselfish devotion never failed to command respect and admiration.

Never of a robust constitution his premature breakdown in health was at least in some measure due to his intensive application to the various tasks he had set for himself. Not only had he a very large surgical practice to take care of, beside being the Chief Surgeon at the Winnpeg General Hospital and director of the department of surgery in the medical school, but almost every problem of public welfare in his city and province claimed his attention, and often not a little of his energies. No good cause ever appealed to him for support in vain. Throughout his life he served his fellow men and the institutions with which he was connected with zeal and marked ability. While the memory of men for those who have served them the best is notoriously short, there is no doubt that Dr. Halpenny's name will be recorded in the medical history of Canada beside the names of the honoured medical pioneers who have served their profession, their fellow citizens, and their country with unbounded energy and unselfish devotion to their ideals.

B. J. BRANDSON

Dr. Melbourne Edward Armstrong, late of Bridgetown, N.S., died on the first day of the new year. Dr. Armstrong graduated at the University of New York in 1892, and for a time thereafter practised at Freeport, but most of his professional life was spent at Bridgetown. There he was not only a busy and successful practitioner but was for many years physician to the Annapolis County Asylum and Medical Health officer for the County. He was also an expert gardener and orchardist, keenly interested in the work of his church and in local history, and prominently identified with a variety of other activities. He was a brother of Hon. E. H. Armstrong, formerly premier of Nova Scotia, and now a Judge of the County Court.

Lieut.-Col. F. McKelvey Bell, prominent in the Canadian medical service during the Great War, died at New York on January 6, 1931, following a brief illness at the Polyclinic Hospital where he was a member of the medical staff. He was 52 years old.

One of the first to volunteer with the Canadian army, Col. Bell went to France and organized the first Canadian hospital at Le Touquet. In recognition of his services he received the Mons medal from the British Government. He had participated in the first Battle of Mons in 1914.

After two years in France he was recalled to Ottawa by the Canadian authorities and was appointed deputy director of medical services for Canada. Two years later he was sent to Halifax as director of medical service for the Maritime Provinces.

At the time of the disastrous explosion in Halifax, December 6, 1917, when a munition ship blew up and levelled a large part of the city, killing nearly 2,000 and rendering 20,000 homeless, Col. Bell was director of medical services for Military District No. 6, with headquarters in Halifax.

He was one of those who led the gigantic task of restoring order from chaos, organizing emergency hospitals, recruiting workers and building shelters for the homeless. He remained in Halifax for some time, administering the relief work carried out by the military medical service.

Dr. Bell also organized the Department of Soldiers' Civil Re-establishment, of which he became medical director. He resigned in 1921 to resume private practice, going to New York.

Col. Bell was a contributor to medical journals and was author of a novel, "Vortex," and treatises on "First Canadians in the War," and "The Romance of the Halifax Disaster." He was a graduate of Queen's University and Royal Military College in Kingston, Ont., the city of his birth, and had taken post-graduate studies in universities of England, France, Germany and Austria.

Military honours were paid the deceased in New York, though it had been at first planned to have a military funeral in Kingston. The remains after arriving in Kingston, were taken to Cataraqui Cemetery, where a simple burial service was conducted.

The late Dr. Bell was a brother of R. C. Bell, of Kingston, and also of Dr. J. H. Bell, of Hamilton, former Mayor and alderman of Kingston. A sister, Mrs. Grant, of Hamilton, also survives, in addition to the widow of the deceased, two sons and a daughter.

Dr. Bernard Gervase Connolly, of Ottawa, passed away on January 11, 1931. Dr. Connolly, who was in very poor health during the week, was unconscious for the best part of a day. He suffered in health following a train wreck in which he was involved between Toronto and Ottawa some time ago.

A native of Trenton, Ont., Dr. Connolly was born on December 9, 1865, the son of the late Bernard and Catherine Murray Connolly. After receiving his early education in separate and high schools of that town, he eventually became a teacher in the public schools, and later taught in the Institution for the Blind at Brantford, Ont., for four years. In the year 1896 Dr. Connolly graduated in medicine from the University of Toronto, and for seventeen years practised his profession at Renfrew, Ont. For a number of years he was a medical officer in the Forty-second Regiment, and retired with the rank of Captain.

It was not Dr. Connolly's desire, but there is at least one permanent record of his work as a doctor in Renfrew which will be read for many years in "The Autobiography of a Tramp," written by W. H. Davies. The writer, later to become widely known, was in the early 'nineties just what the title of his book indicates —a tramp. During one severe winter he attempted to beat his way from Renfrew to the West but losing his hold fell below the train and was dreadfully mangled. Dr. Connolly was called and by his skilful work saved Davies' life. In later years when the former tramp became known to the literary world he rewarded the man who had saved his life with a record of the event in his book.

When he turned his attention to finance, Dr. Connolly became the vital and directing force in the organization of the Capital Trusts Corporation, Limited, with head office at Ottawa, with branches in Montreal and Toronto.

In the year 1908 Dr. Connolly ventured into politics, standing as a Liberal candidate for the Ontario Legislature in South Renfrew, but was unsuccessful. Ever a keen and active politician, he was President of the South Renfrew Reform Association, and took a leading part in all campaigns in South Renfrew during the time he resided there.

A prominent worker in the interests of boy welfare work, he gave many years of service to the Ottawa Boys' Club and kindred organizations, while he had the honour of holding the office of Provincial Chief Ranger of the Catholic Order of Foresters.

Dr. Connolly was a member of the National and Ontario Clubs of Toronto; the Rideau, Laurentian, Canadian, Rivermead Golf, and Connaught Jockey Clubs of Ottawa.

He is survived by his widow, formerly Anna Mary Devine; one brother Frank, of Brockville, Ont.; and one sister, Miss Helena Connolly, of Ottawa. Interment took place at Renfrew, Ont.

Dr. Robinson Cox, who for some time held the distinction of being the second oldest living graduate of Dalhousie University, died at his home, Upper Stewiacke, N.S., on January 6, 1931, in his ninetieth year. He graduated at Dalhousie in 1875, and throughout his long, busy and arduous professional career was held in the affectionate esteem of an ever-widening group of admiring friends. He was a skillful practitioner and a very perfect gentleman. On several occasions his medical colleagues took advantage of opportunities to do him special honour. In his passing we have lost another of "our fathers", for whom we cherish fond and delightful memories.

Dr. Albert John File, of Ameliasburg, Ont., one of the oldest practising physicians in Canada, died on January 6, 1931, in his eighty-ninth year. He was a graduate of Queen's University (1869). Last November he and Mrs. File observed the sixtieth anniversary of their wedding.

Dr. Malcolm Robert Graham, till recently Superintendent of the Essex County Sanitarium, Sandwich, Ont., died from a sudden heart attack in December 25, 1930. Latterly, his health had not been good. Dr. Graham was recognized as an expert diagnostician in tuberculous cases, and had served with the Canadian Army Medical Corps in France, being attached to the 47th Canadian Infantry Battalion. He was invalided home after three years and was later connected with the D.S.C.R. as a medical examiner. Dr. Graham was a graduate of Toronto University in 1909.

He is survived by his widow and two children, Margaret and Ian.

Dr. Joseph Sutherland Graham. After an illness of seventeen months, Dr. Graham, of Toronto, died on January 6, 1931, at Hamilton, Bermuda.

Dr. Graham, the only son of the distinguished physician, the late Dr. James E. Graham, was born in Toronto June 3, 1880, and was educated in his boyhood at the Moravian Brothers Seminary, Nyon, Switzerland, and at Upper Canada College, Toronto. His medical degree was obtained from the University of Toronto, and he subsequently took the degrees of L.R.C.P. and M.R.C.S. at London, England.

In 1906 he married Eleanor, third daughter of the late Sir John Boyd, who survives him, with four children—James, Allen, Elizabeth and Lucie. Other survivors are the mother, Mrs. J. E. Graham, a daughter of the late Hon. J. C. Aikins; and three sisters, Mrs. C. P. Smith, Mrs. H. B. Housser, Miss Florence Graham, all of Toronto. For 25 years, Dr. Graham was a general practitioner in Toronto, and, for several years, was lecturer in pathology and histology at the Dental College.

Dr. Graham's skill as a physician established him as an eminent member of the profession, and his warm sympathy made him the friend of every patient. He was a fluent speaker, and a man of fine literary culture. In religion he was an Anglican, a member of St. Paul's Church, Toronto.

Dr. James Thom Hope, of Alexandria, Ont., died at his home on January 4, 1931, in his fifty-seventh year. He was a graduate of McGill University (1901).

Dr. Charles Jose, of Kirkton, Ont., died on January 12, 1931, at his residence. He is survived by his wife

and two sons, Dr. G. H. Jose, of Kirkton, and Dr. J. P. Jose, of St. Mary's.

Dr. Arthur A. McCann, veteran physician of Sudbury, Ont., died in Ottawa on January 5, 1931, after a brief illness. He was enjoying a short visit to the Capital when he was taken down with the fatal illness. Dr. McCann was 76 years af age, and had practiced in Sudbury for a quarter of a century. He was born in Oxford Mills, Ont.

Dr. James Yerex McLachlan, of London, Ont., died on September 9, 1930. He graduated M.D. in 1888 at the University of Western Ontario, and M.B., Toronto, in 1889.

As we go to press we learn with great regret of the death of Dr. C. J. C. O. Hastings, lately Medical Officer of Toronto, which occurred on January 17, 1931. Fuller notice will be taken of this sad event in our next issue.

News Items

Maternal Care

The Victorian Order of Nurses for Canada has been requested by the public health nurses of the City of Toronto (The Community Health Association) to hold an Institute on maternal care in that city early in the New Year. The object of the Institute is to emphasize from the nursing viewpoint the importance of, and to teach what is adequate in prenatal care; and how, working in cooperation with the medical profession and through effective use of existing agencies, to make such care available for every expectant mother. Medical advice will be sought and appreciated insofar as teaching material is concerned. Some of the most essential points to be dwelt upon are the community relationships involved, the nurse's responsibility toward the medical profession and health officials, to expectant parents, and with regard to the education of the public as to the necessity of medical advice and follow-up throughout pregnancy. It is considered quite probable that nurses in cities other than Toronto, and whether engaged in institutional, private duty or public health work, may be interested, and that there may be requests to hold institutes in different parts of Canada.

The plans so far are not completed but the time allotted should not exceed three days, nor the number of sessions probably be more than six of two hours each. It is not intended that less than fifteen or more than thirty nurses shall be registered for one institute. Physicians wishing to attend are welcome. The subject matter consists of general discussion on the maternity situation and the part the nurse might well take in assisting to better maternal welfare conditions; the essentials of pre-natal teaching; possibly two demonstrations on delivery and post-partum care; with plenty of time for questions and discussion. Each branch of nursing would undoubtedly be represented in the first institute. There will be a registration fee.

Those arranging for the institute assume responsibility for securing a room and the necessary equipment, make the local contacts and arrangements and become responsible for registration and collection of fees.

The responsibility of the Victorian Order is to supply the person to direct the institute, pay her expenses, and supply any necessary teaching or demonstration material.

In the meantime, this institute work will be undertaken by the Central Supervisor of the Victorian Order of Nurses for Canada, Miss Ethel Cryderman, who is an exceptionally well-qualified person to undertake it.

The Victorian Order of Nurses for Canada welcomes the opportunity of extending its field of usefulness. In working out the plan briefly outlined above, it is hoped to evolve something truly Canadian in character which should result in more intelligent, uniform and effective teaching being given, and, through bringing representative nurses together for conference and discussion under leadership, should strengthen the relationship between the medical and nursing professions, and eventually, through the interested health and social agencies represented and working towards this end, prove a valuable contribution to the welfare of the mothers and future citizens of our country.

A Red Cross Hospital Burned

Word has been received that the small Red Cross outpost hospital at Carragana, Sask., has been burned. This was a small three-bed hospital serving an area in the north-east portion of this province. Thanks to the cooperation of local citizens and to the administrative facilities of the Red Cross organization, there was but a twenty-four hour interruption in the service. Emergency supplies were sent out from Regina upon receipt of the information, and upon the day following the fire an emergency station was set up in the Anglican rectory. Nursing service is maintained from this new headquarters and one bed has been prepared for emergency cases. We understand that the hospital will be rebuilt.

Tuberculosis in Labrador

The fourth annual report of the Grenfell Association of Great Britain and Ireland for the year ended September, 1930, refers to the need for more extensive public health work on the coast of Labrador, especially in tuberculosis. At Harrington Harbour last winter seven of the eight patients in the local hospital at one time are stated to have suffered from this disease. The proportion is evidently not abnormal, and is attributed partly to careless habits and unhygienic domestic conditions. Progress in preventive education is hampered by lack of suitable material for propaganda purposes. Other prevalent diseases were pneumonia, rickets, and beri-beri, which were aggravated by the lowered resistance and insufficiency of food and clothing during an exceptionally severe winter. In appealing for increased financial support to maintain its hospitals, nursing stations, and industrial centres, the committee (82, Victoria Street, S.W.1) draws attention to the fact that about £10,000 will be required to rebuild its hospital at Battle, which was recently destroyed by fire.

GREAT BRITAIN

The New Year's Honours

Among the New Year's Honours may be noted the following creations:—

BARON.—Sir Ernest Rutherford, M.A., D.Sc., LL.D., Ph.D., F.R.S., Professor of Physics, Cambridge University. Sir Ernest Rutherford was Professor of Physics at McGill University from 1898 to 1907.

BARONET.—Sir John Rose Bradford, K.C.M.G., C.B., C.B.E., M.D., D.Sc., F.R.C.P., F.R.S., President of the Royal College of Physicians.

K.C.B. (MILITARY).—Lieut.-General Harold B. Fawcus, C.B., C.M.G., D.S.O., D.C.L., M.B., K.H.P., Director-General, Army Medical Services.

K.C.V.O.—Ashley Watson Mackintosh, M.D., LL.D., F.R.C.P. Ed., Honorary Physician to H.M. Household in Scotland, Emeritus Professor of Medicine in the University of Aberdeen.

London's Birth Rate Reaches a New Low Figure

The lowest birth rate ever recorded in London is announced by the health officer, Dr. F. N. Kay Menzies, for the year 1929. Births in that year numbered 70,089, or 15.8 per thousand of population, against 16.2 in 1928. The number was actually fewer by 887 than in 1918, when the influence of the Great War was at its height. Deaths in the civil population during the year under review numbered 62,889, or 14.2 per thousand, against 12.1 of the previous year. This increase was due to the influenza epidemic, associated with an unusually rigorous winter, and in addition to the prevalence of whooping cough.

A New Book on Lord Balfour

The Cambridge University Press published in December *Lord Balfour in his Relation to Science*, a short memoir written at the request of the council of the Royal Society by Lord Rayleigh. The book is limited to an account of Lord Balfour's scientific and philosophical thought and his administrative work for scientific, industrial, and medical research.

ALBERTA

Dr. G. M. Little has been appointed medical officer in charge of the newly formed health unit at Red Deer, and Dr. W. G. Saunders in charge of the one at High River. This new scheme in health work is largely in the nature of an experiment in Alberta, and both the Provincial Government and the Rockefeller Foundation are behind this innovation. How it will work out remains to be seen, though there are possibilities of much good being accomplished. The Hon. George Hoadley, Provincial Minister of Health, has stated that if these two health units bring about the desired results, other units in other parts of the province will be formed without much delay.

Drs. Little and Saunders, who formerly practised at Viking, have left for the east, under a grant from the Rockefeller Foundation Fund, where they will spend the coming six months in special public health work before they return to their respective posts in charge of the health units.

A new register of practitioners has been published by the College of Physicians and Surgeons of Alberta, which shows that there are about 575 members practising in the province. Half of this number are in the four cities of Calgary, Edmonton, Lethbridge and Medicine Hat. This may be the same modern tendency, so widespread over this continent, for physicians to congregate in cities, where the hospital facilities are good and where the drudgery of country practice is almost eliminated. Another fact to be borne in mind is that the farmers throughout this province have met serious reverses of late years and a country physician in very many instances barely makes a living, notwithstanding that he has to do a large amount of work. In the cities competition is far keener and the medical man has to keep abreast of the times as well as to devote every energy to gain a practice and to retain it. In recent years many have left the country for the city, in this province, and, from the standpoint of an observer, it would seem that the provincial government may have to place physicians in country districts where their services may be much required and pay them salaries worthy of their positions. So far the provincial government has not dealt generously with those of our profession who have been under their jurisdiction and who have been sent to remote parts. A labourer is worthy of his hire, and when one considers the meagre pittances which the Department of Health of this province has paid some of these physicians, one can only blush with shame. Long years of training in an arduous profession demand more generous treatment than has been meted out.

The perennial harvest of new resolutions from various district associations of the United Farmers of Alberta Organization is once more ready to be garnered and passed on to the parent body for assimilation. These are in reference to public health matters. During the past nine or ten years the number of resolutions along these lines has steadily increased. At the time of writing, a number have been made public in the official organ of the United Farmers of Alberta. That the average farmer in Alberta is intensely class conscious and a strong believer in paternalism may be deduced from the many legislative measures which have gone on the statute books relative to public health affairs in recent years. They seem to forget that physicians have to make a living and that in these parlous times it is difficult to make ends meet. It has been computed, and the facts given are from reliable sources, that the medical profession in this province give in work which may be termed charitable well over one million dollars a year. In the estimate of the writer, class consciousness carried out to the degree it has reached in this province cannot survive, as it will become a public menace. Hence it is but logical to believe that extreme measures adopted by the United Farmers of Alberta will in time lead to their own undoing.

On the agenda for the forthcoming meeting of the United Farmers of Alberta is one item which shows the trend of thought among the agrarians: "That this convention goes on record as believing that under the present economic conditions this is the proper time to urge the government to adopt, step by step, more complete hospitalization and medical aid and thereby bring about the establishment of state medicine." The resolution states that the present way of taking care of hospital and medical cases is not satisfactory, and places undue hardship on many families in rural districts.

Another resolution along similar lines is the following: "That the provincial government be requested to investigate the advisability of organizing hospitals on a provincial basis with a fully qualified physician and surgeon in attendance". The resolution suggests that the surgeon's salary should be met by a provincial tax, the patients to pay a small additional charge. In support it urges that present charges are so high that it is impossible for ordinary working people to get treatment, and that the general health is the greatest asset of the province. I am quite sure of what I state when I say that no patient is ever refused operative treatment and care by any surgeon in this province. In the great majority of surgical cases, the surgeon receives only a small portion of his fee, and very often nothing at all for the skill and care which he has given. Altruism is an unknown quantity with the agrarian, it would seem.

Another resolution is as follows: "That we recommend a system of centralization of hospital facilities in three or more points in the province, whereby large thoroughly equipped hospital units could be provided to take care of all cases at reasonable rates with special rates and provisions for indigent cases which should be paid for by the municipality responsible therefor". It is proposed that deficits in the operation of such hospitals should be met by a tax on all rentable land and property in the province excepting those areas with hospital facilities of their own. The preamble argues that the cost of the municipal hospitals is too great in comparison with their scope of usefulness.

Already this province is tax-ridden, yet the farmers wish to add further tax burdens. Our provincial debt has almost been doubled since the Farmer Government came into power. Any hope of redemption does not lie along the line of increased taxation. Yet another item to be brought forward in the form of a resolution is "That we petition our government to amend the Hospitals Act so that there may be held an annual meeting in the hospital area".

Another resolution which deserves notice is the following: "On the ground that many people become narcotic addicts from the use of patent medicines and soft drinks this resolution requests that all patent medi-

cines and soft drinks be labelled so as to show exactly the amount of such drugs they contain''. If I may offer criticism here, it is on the ground of the rarity of such occurrences. I have yet to see one addict who attributed his fall from grace through using patent medicines or soft drinks. One does hear sometimes of women, who, though through conviction they are temperance reformers, have become addicted to the use of patent medicines on account of the strong alcoholic content of such mixtures.

And yet another resolution for ''the creation of a board of three qualified chiropractors, to examine applicants for licenses to practise chiropractic and to exercise general powers for the chiropractic profession in Alberta, since chiropractic is a science distinct from all other methods of healing, and that chiropractic schools teach nothing of medicine or surgery or osteopathy, but confine their instructions to the requirements of their own practice.'' How delightfully naive and innocuous this sounds, yet behind it is the desire to dissociate the chiropractors from any connection with the Act passed years ago, which stated that any chiropractor desirous of practising in Alberta would have to pass an examination before a board of medical examiners appointed by the University of Alberta. Not one chiropractor has been able to pass these examinations in all the years which have elapsed since the Chiropractor Act went into force. The same stringent rules should be kept in force as in the past; in fact it would be better if the title of ''doctor'', was prohibited as this has been enforced in other provinces in Canada with good results.

During the eleven months of 1930 the Calgary Municipal hospitals have operated at a deficit of $112,477.57. This amount will be charged to the mil rate. Revenues from all sources totalled $168,922.29, while expenditures amounted to $281,469.86. During the month of November the Calgary General Hospital operated with a deficit of $6,682.37 chargeable to the mill rate, while the Isolation Hospital finished the month with a deficit of $2,537.35 in expenditures over revenues. The deficit at the small-pox hospital was $51.56. The total charge to the mil rate for all hospitals for the month of November amounted to $9,271.28. Revenue at the General Hospital during the month amounted to $14,678.56 while expenditures totalled $21,360.93. At the Isolation Hospital revenue totalled $339.00 and expenditures totalled $2,876.35.

An address of much interest was given to the members of the Calgary Medical Society by Dr. J. S. McEachern on ''A Medical Detective Story'' in which he reviewed the history of bubonic plague from ancient times down to the discovery of the *Bacillus pestis* simultaneously by Kitasato and Yersin in 1894. In the reign of the emperor Justinian, there was a widespread epidemic of this disease which spread over the Roman Empire, and brought death to nearly 50 per cent of the people. During the fourteenth and seventeenth centuries the greater part of Europe was stricken. In India during some years of the present century as many as 500,000 people have died from it. The pneumonic type of plague is probably the most severe and from such cases the disease may readily spread. During the late ''nineties'', following the discovery of the *Bacillus pestis* two Commissions in India were appointed by the British Government to determine the mode of transmission of this disease. Numerous experiments proved that the flea which is found in the hair of the rat was the active agent. A potent serum is now in use, which, if used within the first twenty-four hours, has the same beneficial effect that anti-diphtheritic serum has in a case of diphtheria when used within the same period.

G. E. LEARMONTH

BRITISH COLUMBIA

Dr. A. D. Lapp, Medical Superintendent of Tranquille Sanatorium, announces a short intensive postgraduate course in tuberculosis work. The course is limited to ten members of the medical profession in British Columbia and will deal particularly with treatment.

The Cancer Committee of the British Columbia Medical Association, in an effort to arouse public interest in the treatment of cancer, is taking steps to have this disease included in the list of those notifiable to the Provincial Health Department.

The annual report of the Provincial Board of Health states that it is estimated that there are in British Columbia two thousand active cases of tuberculosis. During the year ending June 30, 1930, 384 new cases and 584 deaths were reported. It is pointed out that these figures are influenced by two factors, *viz.*, the prevalence of tuberculosis amongst the Coast Indians and the demobilization in British Columbia of large numbers of invalided soldiers, 400 cases at Tranquille falling into the latter category.

During the twelve-month period there were 151 cases of smallpox, with no deaths; 70 cases of typhoid fever with 10 deaths; and 42 cases of poliomyelitis with 6 deaths. Among the rarer conditions might be mentioned; 4 cases of bacillary dysentery; 1 case of amœbic dysentery; 2 cases of malaria; 10 cases of trachoma; and 9 cases of psittacosis.

Considerable space is devoted in the report to the inspection of schools, and in this connection it is interesting to note that at Saanich a full time health unit was able to reduce the costs of isolation in hospital from $2,110.00 in 1925 to $350.00 in 1930. At the same time the improvement in attendance of the pupils raised their scholastic achievement, so that while in 1928 the cost to the Municipality of retardation (as shown by ''repeaters'') was $17,000, two years later this was reduced to $11,000.

The Vancouver Graduate Nurses' Association has issued an appeal to the medical men to cooperate with them in allotting nursing duties; it being pointed out that under the present conditions an equitable rotation of the available work is essential to offset as far as possible very serious hardship to members of the nursing profession.

C. H. BASTIN

MANITOBA

The Cancer Relief and Research Institute of Manitoba has purchased some 900 milligrams of radium to be used in the treatment of cancer in the province. Of this amount 200 milligrams, in the form of needles and plaques, were obtained from local physicians, and 700 milligrams from the Radium Chemical Company of New York in four tubes of 50 milligrams each, and 500 milligrams in solution for the production of radon. The radium emanation plant to be established in the Medical College will be directed by P. A. Macdonald, Ph.D., a distinguished student of physics, who has recently returned from a three months' visit to New York, Toronto and other centres where he investigated the operation of radium emanation plants. Prof. Frank Allen, Head of the Department of Physics in Manitoba University, will be consultant. The Winnipeg General Hospital and St. Boniface Hospital will form tumour clinics and the Cancer Institute will cooperate with these clinics on request.

The January meeting of the Winnipeg Medical Society on January 16th was devoted to cancer. Dr. N. J. Maclean read a paper on "The outlook in surgical treatment of cancer", and Dr. B. J. Brandson one on "Carcinoma of the breast." The discussion was led by Drs. Hugh Mackay and F. A. Smith. Dr. J. D. Adamson presented a report from the Cancer Relief and Research Institute.

As the departure of Dr. J. C. B. Grant, who for a number of years had been Professor of Anatomy in Manitoba University, coincided with the activities incident to the Winnipeg meeting of the British Medical Association little attention was paid to it at the time. His colleagues in the Medical Faculty, however, desirous of showing their appreciation of him and mindful of his studies in the anthropology of the Indians of western Canada, recently purchased an oil painting of the head of an Indian by N. Grandmaison. The following words were inscribed on the back of the picture which has been forwarded to Toronto where Dr. Grant now holds the position of Head of the Department of Anatomy:

"Presented to Doctor J. C. B. Grant by his colleagues of the Medical Faculty, University of Manitoba, on the occasion of his resignation of the Chair of Anatomy, July 25, 1930."

The subject of the portrait is "See-Kee-Quatin", of Duck Lake, Saskatchewan, one of the braves who fought with Louis Riel and Gabriel Dumont in the Northwest Rebellion of 1885.

The Medical Service Committee of the College of Physicians and Surgeons of Manitoba and the Manitoba Medical Association has recently sent out to all registered practitioners in the province a confidential questionnaire. The information asked for was the total professional income in 1929; the cost of carrying on practice in that year; the net professional income; an estimate of the amount lost by free service, service at reduced rates, and bad or uncollectable debts; an estimate of the value of work done as a member of the public staff of a hospital; whether practice is general or special, in greater Winnipeg or in the remainder of the province. A large number of replies have already been received.

ROSS MITCHELL

NEW BRUNSWICK

The Provincial Government of New Brunswick has appointed a Committee to thoroughly investigate the administration of the Workmen's Compensation Board. This investigation does not include in its present scope any medical question but rather will confine itself to estimate the added charges necessary to provide a greater percentage of compensation to the injured workman.

There has lately been an epidemic of diphtheria in the City of Saint John. It is remarkable that practically all of the cases are those that were for some reason or other missed at the general inoculation carried out by the Board of Health two years ago. A further campaign of education and inoculation is being carried out by the Board under the direction of Dr. Wm. Warwick, Chief Medical Officer.

At the annual meeting of the Board of Commissioners of the Saint John General Hospital, Dr. O. B. Evans was appointed to a junior staff position in surgery. At the same meeting, Dr. George Skinner was appointed to the out-door surgical staff of the hospital.

The Board of Commissioners of the Saint John General Hospital has invited Lord Dawson of Penn to be the chief speaker at the opening of the new hospital next August.

Dr. Oswald McDonald was appointed, in January, to the indoor medical staff of the Saint John General Hospital.

Dr. E. O. Petrie, late of Carbondale, Pennsylvania, has been appointed roentgenologist at the Saint John Infirmary.

The Provincial Government of New Brunswick is being approached by the New Brunswick Medical Association in the hope that the government will supply sufficient money for the purchase of radium to provide treatment for indigent cancer cases.

Dr. Stanley Bridges, of Saint John, has recovered from a recent severe illness and is again able to follow his practice.

Dr. G. G. Corbet, who was recently confined to his home for a considerable period by illness, is again sufficiently recovered to resume his practice.

Dr. W. M. Jenkins, of Gagetown, is slowly recovering from an injury received when a tree fell across his legs. The Doctor was severely bruised and his recovery has been delayed.

Dr. Laughlin McPherson, of the staff of the Saint John Tuberculosis Hospital, is still confined to bed following a severe attack of typhoid fever.

A. STANLEY KIRKLAND

NOVA SCOTIA

A large class of nurses graduated from the training school of the Halifax Infirmary on December 30th. Two members of this class bear the distinction of having captured the two highest places in the recent provincial examinations for registration. Among the speakers at the graduating exercises was Hon. Dr. George H. Murphy.

A number of buildings on Queen Street are now being demolished to make room for the new buildings of the Halifax Infirmary. The contract for the erection of the new institution has been awarded, and it is expected that it will be ready for occupancy early in 1932. A number of novel features are included in the plans, and we are promised a very modern and fully equipped hospital, which is designed to accommodate one hundred and fifty patients, to cost about a million dollars.

Dr. Eliza Brison, of Halifax, has been appointed Provincial Psychiatrist to fill the vacancy created by the resignation of Dr. Clyde Marshall. Dr. Brison's duties, it is stated, will be principally in connection with the Training School (for the feeble-minded) recently established near Truro, where she is to take duty about the first of February. She will, however, also undertake some of the outside work initiated by Dr. Marshall.

After graduating at Dalhousie in 1911, Dr. Brison

spent several years on the medical staff of an American hospital for the insane, and later assumed charge of the home for feeble-minded children which was maintained at Halifax by the I.O.D.E. for some years subsequent to the disaster of 1917. She has thus had considerable experience at the special work to which she is now returning.

Hon. Dr. George. H. Murphy was recently sworn in as Minister of Public Health for the province of Nova Scotia. About a year ago Dr. Murphy became a member of the provincial government without portfolio, and, at a by-election, was returned to represent the constituency of Halifax by a very large majority. It was expected at that time that he would eventually take over the portfolio of Public Health, so the announcement of his appointment does not occasion surprise. Members of the profession have been urging for several years that several activities related to the public health, which have been administered by different departments of government, should be brought together under one official head. It is anticipated that this will now be done, and Dr. Murphy's career in the important position to which he has been called will be followed by the keen and sympathetic interest of his colleagues. Quite irrespective of party affiliations, the new minister enjoys the confidence and esteem of his professional associates. He has achieved notable success as a surgeon and as a teacher of surgery, has been prominent for many years in the councils of our medical organizations, and knows the mind of the profession relative to public health matters. It is confidently believed that his administration will prove to be energetic, progressive and judicious.

The death of Lt.-Colonel McKelvey Bell, which occurred at New York on January 6th, recalls the dreary and strenuous days which followed the Halifax disaster of 1917. Colonel Bell had shortly before returned from the front, and was the A.D.M.S. of M.D. 6 at the time of the explosion. He was made chairman of the Medical Relief Committee, and was mainly responsible for the very rapid and efficient way in which emergency hospitals were equipped and organized, and for the manner in which physicians and nurses were mobilized for the vast volume of work which had been created in a single moment. No building in the city escaped serious damage and the hospitals fared as badly as any. Hospital windows were shattered and were hurriedly boarded over to provide protection from weather; operating-room equipment was damaged; several doctors and nurses were among the wounded; and for a time no electric current was available. Under such conditions immediate provision had to be made for many thousands of seriously injured persons. Colonel Bell impressed college and other buildings which were at all adaptable for hospital purposes, had the required plumbing and other necessities installed, and within a very few days had the work of medical relief generally very well systematized. Medical units sent from outside the city, including several from the United States, were, as far as practicable, given the opportunity to work as units. In such an unusual emergency, Colonel Bell demonstrated organizing ability which won the admiration of all who cooperated with him and the gratitude of the people of Halifax and surrounding districts. After demobilization, Colonel Bell went to New York, where he resumed medical practice. Before the war he had been engaged in practice at Ottawa.

Dr. James W. Reid, formerly of Newport, has recently returned from a prolonged period of study in London, where he obtained membership in the Royal College of Physicians. It is understood that he will now settle in Halifax.

W. H. HATTIE

ONTARIO

The Osler Society of London held its annual banquet at the Hotel London on November 29th. Dr. Norman B. Gwyn, of Toronto, nephew of Sir William Osler, delivered the annual Osler oration. He described the early home surroundings and the later academic environment of his illustrious uncle. Personal reminiscences and original documents brought Sir William Osler as close to all present as is now possible. Dr. Gwyn presented to the Osler Society a gavel made of wood taken from the Osler home at Bond Head. Dudley Rogers, President of the Osler Society, was chairman, and Carl Morlock, Vice-president, introduced Dr. Gwyn. The Medical School Orchestra furnished excellent music during the evening.

Dr. S. Pritchard, a graduate of the University of Toronto, and for some years an assistant to Dr. Elliott and Dr. Parfitt at the Muskoka Sanatorium, has been for the past several years, Director of the Chest Department of the Battle Creek Sanatorium, at Battle Creek, Michigan. Dr. Pritchard is known internationally as an authority on pulmonary diseases. At his own request he has recently been released from his duties at the Battle Creek Sanatorium, but will continue as a consultant. He has been appointed Director of the W. K. Kellogg Foundation, which is devoted principally to research in diseases of children and child welfare. His many friends in Ontario wish him every success in his new field. Dr. J. K. M. Gordon, for many years in practice in Ontario, and in charge of the Lady Gray Hospital in Ottawa, succeeds Dr. Pritchard as Director of the Chest Department of the Battle Creek Sanatorium.

At a meeting of the Board of Trustees of the Hospital for Sick Children held on January 11th, Dr. Allan Canfield was appointed physician-in-charge of the Mothercraft Centre, recently established in Toronto. Dr. Canfield has been prominently identified with the work of the hospital for some years as a staff physician.

The principal purpose of the Mothercraft Centre, which will be located in the Cottage Hospital on Wellesley Street is to provide against under-nourishment of infants whose mothers are desirous of giving them natural feeding, but because of easily correctible reasons are unable to do so.

Miss Helen C. Satchell, formerly assistant to the matron at the Mothercraft Hospital, Highgate, London, England, has been appointed matron of the Toronto centre which, it is hoped, will serve not only the city, but the province, with the Hospital for Sick Children as the nerve-centre of the system.

It is believed that there is a distinct need here also for graduate nurses who are specially trained in the care of mothers and newly-born infants, and, therefore, it is proposed to introduce a post-graduate course for trained nurses, graduates of any registered hospital, designed to fit the nurse for this special work, to be carried on either under governmental auspices or in the course of private duty.

Dr. George D. Lockhart, of King, Ontario, has been appointed surgeon at the Toronto Municipal Farm. He replaces Dr. C. A. Ames of Newmarket who was temporarily appointed to fill the vacancy caused by the death of Dr. Johns. Owing to ill health, Dr. Ames resigned the post.

The following transfers within the Ontario hospitals have been announced by the Honourable Dr. J. M. Robb, Minister of Health for the province:—

Dr. D. O'Gorman Lynch, Senior Assistant Physician at Brockville, is transferred to the position of senior

assistant physician at London. Dr. Claude A. McClenahan, assistant superintendent at Mimico, replaces Dr. Lynch at Brockville. Dr. Archibald McCausland, senior assistant physician at Kingston, is transferred to a similar position at the Mimico Hospital. Dr. Homer C. McQuaig, who has been attached to the staff at Kingston for three years, succeeds Dr. McCausland as senior assistant physician. Dr. J. N. Senn, who has been connected with the Hamilton Hospital since 1923, becomes senior assistant physician at Whitby. Dr. John Webster remains at Whitby as assistant superintendent. Dr. R. C. Montgomery, formerly at the Whitby Hospital, will succeed Dr. Senn at Hamilton. Dr. Chas. H. Pratt, who has been at the Woodstock Hospital since 1925, is promoted to the position of senior assistant physician at that hospital. Dr. A. J. Kilgour who has been for four years at Kingston, is transferred to the Psychiatric Hospital, Toronto, as senior assistant physician. Dr. J. R. McGeoch, a member of the staff of the Psychiatric Hospital, Toronto, for the past five years, has been transferred to the Ontario Hospital, Whitby.

Dr. E. J. O'Donnell, of Fort Francis, was made a Fellow of the American College of Surgeons at the last annual congress in Philadelphia.

Dr. P. M. Ballantyne, of Port Arthur, sailed from New York on the *Mauretania*, on January 3rd, for England. He will spend the next fifteen months specializing in surgery.

The medical staff and the Board of Trustees of the McKellar General Hospital are very grateful to Madame Ernestine Hamilton, widow of the late Dr. W. H. Hamilton of Fort William, who very generously donated an incubator to the hospital.

After a brief illness, the death occurred on Saturday, December 27th, in St. John's Hospital, Toronto, of Alba Jean, daughter of Dr. and Mrs. W. G. Collison, of Lindsay. Miss Collison was in her nineteenth year, and a student at St. Hilda's College, Toronto. The sympathy of the community and district goes out to the bereaved family in their great loss. J. H. ELLIOTT

QUEBEC

At the end of 1930, there were in Quebec province twenty-three County Health Units Covering twenty-nine counties. The first to be opened was at Beauce in 1926, and this was followed in the same year by the Units of St. John-Iberville and Lake St. John. This experiment proved to be of such value that others have come in existence every year: St. Hyacinthe-Rouville was created in 1927; the following year came Temiscouata, Nicolet, Joliette, Terrebonne; in 1929, L'Assomption-Montcalm, Chicoutimi, Temiscaming, Megantic, Kamouraska-L'Islet; and in 1930, Lotbiniére, Matane, Lévis, Châteauguay-Laprairie-Napierville, Argenteuil, Bonaventure and Labelle were founded.

The Beauce Unit was at first the school where the future medical officers and nurses were trained, the former also following courses in other special schools. But the Director of the Provincial Bureau of Health and the Deputy-director who has the immediate charge of the units were quick to see what advantages would be gained by the opening of a training school for the purpose of preparing the staff and this school was created in 1929 at Beauceville.

Each Unit is administered by a full-time Medical Officer. The complete personnel is composed of 24 medical officers, 5 district health inspectors, 64 nurses, 1 sanitary engineer, 24 sanitary inspectors, 4 tuberculosis clinicians, all at full-time, 2 part time sanitary inspectors and 6 part time tuberculosis clinicians.

The population served by the 23 Units is 767,062. The Unit with the highest population is Chicoutimi with 56,498, and that with the lowest population is Temiscaming, with 14,920. The mean population is 33,133 per Unit and 26,278 per county.

If the total population of the province be estimated at 2,735,000, after deducting 1,093,800 for the cities having their own public health organization and the 767,062 people at present served by the Health Units, there remain 874,138 persons yet to be organized under the system of County Health Units. This means that at the close of this year nearly half of the population that may be organized under this system is, for public health purposes, in the hands of an organization similar in most respects, for small centres and rural districts, to the Health Departments of the cities which have their own organization.

This remarkable result has been obtained in less than four years, and when it is taken in account that in 1930 only ten Units, including almost one-half of the total population, have been created, this means that a couple of years at the most will be needed to bring the whole province under this system.

The organization is under the control of Dr. Alphonse Lessard, Director of the Provincial Bureau, with his deputy, Dr. Emile Nadeau, directly in charge of the Units.

The annual budget of the County Health Units is generally about $12,000, but two Units have a slightly higher appropriation.

What the Provincial Bureau of Health has done during the year 1929-30 to fight the various diseases affecting the population of this province and to promote hygiene is shown in the eighth annual report of Dr. Alphonse Lessard, Director, tabled in the House by Hon. L. A. David, Provincial Secretary.

His report is quoted in part, as follows:

"It is of interest to consider, however, the losses suffered each year from the various infectious diseases. The year 1929 has been, in this particular respect, a nominal year; in other words, our population has been spared a serious epidemic. The death rate from the principal infectious diseases was 49.1 per 100,000 population, exactly the same as that for 1928. The typhoid fever rate is slightly lower, 8.9 as compared with 9.2; the scarlet fever and measles rates are a little higher. The diphtheria rate is still too high; a total of 401 children were victims of this disease in 1928. I shall indicate, further on, the measures taken by the Bureau of Health to limit the ravages of this scourge which, in the present state of science of public health, should never exist."

Other interesting statistical data are those referring to the mortality from heart disease, the rate of which is now about the same as that of the mortality from tuberculosis. The various diseases of the heart claimed 3,286 victims in 1928, corresponding to a rate of 122.2 per 100,000 population. The deaths from cancer are increasing, 2,131 persons dying from this disease, or a rate of 79.2 per 100,000, as compared with 77.2 for the year of 1927.

"The experience of most of the countries and provinces other than ours is being repeated here. Infant mortality, as well as that from tuberculosis is on the decrease, whereas the mortality caused by certain diseases usually asociated with more advanced age is constantly increasing. Is the diminution, in the first instance due to diffusion of knowledge relating to hygiene? Without doubt. Is the hurried life of modern times and the lack of repose permitted the various organs, responsible for the increase in the second instance? Perhaps. In any event, these findings indicate, to sanitarians, the problems of the future."

Dr. Lessard also points out the success which attended the creation of the county health unit system in this province and other measures undertaken during the latter years.

"During the past year sanitarians from Ontario, Manitoba, various American states, France and Greece have come to spend an interval with the health units of Beauce, Temiscouata, Lake St. John, Terrebonne, St. John-Iberville and St. Hyacinthe-Rouville."

Dr. Lessard referred to measures used by the units to eliminate diphtheria. Mass immunization of the child population has been the means employed. This campaign, undertaken last June in most of the organized counties, was interrupted in October, to be continued in the spring of 1931. On October 1st more than 36,000 children had been immunized.

"Constant progress has been effected for several years past in the organized counties in the protection afforded children from birth to 1 year of age. The following table shows the comparative infant mortality for the years 1926 and 1929 in the first 13 units.

Counties	Infant death rate per 100 living births 1926	1929
Beauce	121.5	87.7
Lake St. Jean	118.9	84.7
St. John-Iberville	125.5	92.0
St. Hyacinthe-Rouville	149.7	107.9
Temiscousta	134.2	98.7
Joliette	158.2	136.4
Nicolet	167.6	117.2
Terrebonne	129.6	105.5
L'Assomption-Montcalm	167.6	142.3
Chicoutimi	161.3	105.5
Megantic	156.7	114.8
Temiskaming	105.2	82.7
Kamouraska-L'Islet	142.2	103.9

"The average death rate of infants under 1 year of age in these seventeen counties was thus: in 1926, 141.4 per 1,000 living births; in 1929 it was 106.1. In other words, for every 1,000 living births, 35 more children were saved and it is claimed that this achievement has been accomplished through the diffusion of knowledge of sanitation affected by the personnel of the county organizations.

"For the purpose of contributing towards the formation of a new mental attitude on the part of the people, an intensive campaign of popular education in public health and preventive medicine was vigorously pursued. During the fiscal year 1929-30 a total of 185,438 persons attended the public or special lectures given by the medical officers, the sanitary inspectors and nurses of the county health units.

"To complete this preliminary work and to make its good effect more lasting in the greatest possible number of homes, 298,047 pieces of health literature were distributed.

"The travelling tuberculosis clinics have been continued in the counties of Beauce, Lake St. John, St. Hyacinthe-Rouville and Temiscouata, and this system has been extended, during the year to the counties of St. John-Iberville, Chicoutimi, Kamouraska-L'Islet, Megantic, Nicolet and Lotbiniere. A total of 9,652 persons were examined at the 535 stationary or travelling clinics, of which number 1,023 were diagnosed as suffering from active tuberculosis. It should be added that, in certain counties where the sanitary inspector is a veterinary surgeon, we tuberculin test the milch cows, with the cooperation of the Minister of Agriculture for the purpose of gradually eliminating bovine tuberculosis. In the course of the past year 5,209 milch cows were tested and 125 were found positive.

"The Provincial Bureau of Health in its fourth annual report (for 1929) summarizes the health conditions which obtain in the province. In the report will be found details of the movements registered by the population during the year 1929, which may be summarized thus: The increase in human capital was 81,380 births, whereas the vital loss was represented by 37,221 deaths. The net profit resulting was 44,159 souls to be added to the initial capital of population, which is in consequence augmented by this amount."

In the Province of Quebec last October a total of 836 infants died, making a general rate of 135.1 per 1,000 births. In the month births in the province totalled 6,187.

Westmount, which reported two infant deaths, as compared with three births during the month, returned a record high rate of 666.7, and headed the list in this respect. Shawinigan Falls, which had a rate of 282.1, made up of 11 deaths as compared to 39 births, was second, while Grand'Mere, which registered three infant deaths as compared to 11 births, returned the third highest rate, 272.7.

The city of Montreal, which accounted for nearly 25 per cent of the total infantile mortality for October, having 199 cases out of a provincial total of 836, had a rate of 128.1, there being 1,553 births in the metropolis; Lachine with 21 births, a rate of 95.2.

Outremont recorded one death, for a rate of 76.9, there being 13 births, while Verdun registered eight deaths as compared to 91 births, for a rate of 87.4 per 1,000.

Urban areas were again chief sufferers from infant mortality in October, there being 415 deaths, for a rate of 143.5, while the rural sectors, though they recorded 421 deaths, only had a rate of 127.8.

Only one place, Granby, returned a clean bill in regard to infant mortality during the month. Five centres recorded one death each, these being: Outremont, Thetford Mines, Valleyfield, Kenogami and Magog.

There were 27 maternal deaths during the month, Montreal registering 3 and Quebec 2. There were 2,807 deaths in all, for a rate of 12.1, with 6,187 births.

Deaths from specified causes in October were:—whooping cough, 19; diphtheria, 35; measles, 10; scarlet fever, 9; typhoid fever, 31; influenza, 36; pneumonia, 151; pulmonary tuberculosis, 174; other forms of tuberculosis, 41; infantile paralysis, 3; spinal meningitis, 2; diarrhœa, 263; violence, 114; syphilis, 16; diabetes, 28; heart disease, 259, and cancer, 174.

Since the opening of the schools of Montreal in September the school inspection officials of the Department of Public Health have examined 388,145 pupils, found 91,611 with various physical disorders, and excluded 3,195 children from school, of whom 2,483 were later re-admitted. School nurses made 10,409 visits to schools and 11,961 to homes. They gave 16,883 sundry treatments to children. Dental inspectors gave 1,671 lectures to pupils, attended by 81,127 children.

In the psychiatric section, a new section opened a year ago, 1,024 pupils were examined. Of these 123 only were found normal, 897 abnormal, and 4 were placed under observation. There were 698 backward pupils put under observation. Psychiatric nurses placed 1,502 children under observation, and examined 507 particularly. They made 54 visits and investigations in homes.

Baby clinics registered 5,619 new babies in the 1930 season, along with 4,847 babies previously attending. Nurses attached to this service received 49,753 visits from mothers and children in the course of the summer and fall, made 41,273 visits to homes, and 14,823 children were vaccinated by doctors at the clinics.

In the diphtheria immunization section, which has 40 clinics throughout the city, there were 37,823 children, of whom 12,290 received the first dose, 9,168 the second and 7,899 the third inoculation.

There are 80 children's boarding homes, it is shown in the report, housing 342 children. Nurses in 1930 made 1,158 visits to these places, and 514 investigations. In addition to the above, nurses made 264 visits to 29 private maternity homes.

In 1930 the Department of Municipal Assistance handled 20,787 cases of sick and disabled persons who were unable to provide their own care in hospitals, and placed them in various institutions. These comprised, hospitalization of patients, 10,835; placed in sanitoria, 215; in orphanages, 394; in other institutions, hospices, etc., 208; in maternity homes, day nurseries, etc., 9,069; school for crippled children, 66; total 20,787.

In addition to this, the department placed 117 persons in incurable hospitals, 269 in the Sacred Heart Hospital for consumptives, 490 children in industrial schools and 964 in reformatory.

The Meurling Refuge in the year just concluded gave 442,479 meals and 214,723 lodgings.

In 1930 the milk inspection section examined 81,774 milch cows, and made 15,211 inspections of dairies in the country. In the city the inspectors made 19,357 inspections of dairies, including 30,334 examinations of milk cans.

The municipal laboratory, bacteriological section, made 36,400 analyses in 1930, including 11,369 clinical analyses, 16,610 of milk and cream, 3,630 of antiseptics, and 2,710 of drugs, narcotics, liquors, etc.

SASKATCHEWAN

The following notice has been sent to all members of the Saskatchewan College of Physicians and Surgeons by the general secretary:

"After an examination made recently into the contracts made between doctors and certain rural municipalities in the province, it appears that the terms are of wide divergence. The Act permits a municipality to pay up to $5,000 per annum. This should be a minimum, not a maximum. A doctor, of necessity, incurs a great expense for office rents, automobile upkeep, books, journals, drugs, dressings, etc., in the earning of the salary he receives. If he keeps abreast of the times, as he should, by taking post-graduate courses, it is necessary to have a reasonable return for his services. If he neglects these things, it will be reflected in unsatisfactory service to his patients, thereby doing both them and himself a great injustice. Even a five thousand dollar salary would seem too low to permit a doctor to live reasonably decently and be in a position to keep himself abreast of the times and, as a consequence, able to render efficient service.

If you are tempted to consider a municipal contract, give very careful consideration to accepting less than the maximum salary under the Act. Don't underbid a fellow practitioner for the sake of getting a job. The profession of medicine is not a job-hunting profession. Be proud of the services you render, and demand to be reasonably paid for them."

The Eastern Saskatchewan District Medical Society was addressed in Moosomin on December 9 by Dr. R. McAllister, of Regina, on "The care of maternity cases", and also by Dr. U. Gareau on "Diarrhœa in infants". Both addresses were followed by full discussions.

Dr. Duncan Croll, who has returned from post-graduate study in Europe, will again be associated with his father, Dr. Andrew Croll, in Saskatoon. He will give special attention to bone and joint surgery, traumatic and orthopædic.

Hon. F. D. Munroe, Minister of Public Health, addressed the Regina and District Medical Society on some of the problems in connection with maternal mortality. He raised the question as to whether the mortality was greater in hospitals or in cases where the delivery had taken place in the home. N. R. Craig, K.C., chairman of the Workmen's Compensation Board, also addressed the meeting, explaining clearly to his audience how impossible it was for the Board to pay full fees.

The provincial government has announced the appointment of Dr. O. E. Rothwell as director of the new psychopathic ward in Regina. Dr. Rothwell graduated from McGill in 1907, and began practice in Regina the same year. For some time he has been physician to the Regina jail.

The appointment of Dr. F. L. Lindsay as radiologist to the Regina General Hospital has been announced by the Board of Governors. He graduated from the University of Manitoba in 1914, began practice in Wapella, Sask., in 1917, and for the past two years has done post-graduate work at the University of Manitoba, the Mayo Clinic, and the University of Minnesota principally.

LILLIAN A. CHASE

UNITED STATES

Fifteenth Annual Clinical Session of the American College of Physicians

The Fifteenth Annual Clinical Session of the American College of Physicians will convene in Baltimore, Maryland, March 23rd to 27th, and in Washington, D.C., March 28, 1931. The organization holds this Session in Baltimore through the cordial invitation of the Johns Hopkins University School of Medicine, the University of Maryland School of Medicine, the Medical and Chirurgical Faculty of the State of Maryland, the Baltimore City Medical Society, and the further co-operative interest manifested by the various Baltimore hospitals and civic societies. Held in important medical centres, these Clinical Sessions constitute, perhaps, the most important post-graduate week in Internal Medicine each year. Those who attend the meeting will find ample in the way of clinical, laboratory, research and historical interest, to repay them well for the time spent in making the journey.

As an added feature of the Clinical Session this year, an additional day, March 28th, will be spent in Washington, D.C., where a special program of clinics and inspection tours has been arranged under the auspices of the Medical Departments of the United States Army, United States Navy, United States Public Health Service and Georgetown University.

The entire program of the Clinical Session is characterized by new subjects, new authors and wide geographic representation. It is significant that the Committees have attempted carefully to avoid repetition of subjects and authors, as has so often been the case in previous years, not only on the program of the American College of Physicians, but on the program of

a great many medical organizations. On the General Scientific Programs there will be forty-five or fifty selected formal papers. Symposia on blood diseases, oxygen therapy, diseases of the liver, recent advances in endocrinology with particular reference to the newer work on supra-renal extracts, myocarditis, and several other subjects have been arranged. At Baltimore's many modern and excellently operated hospitals, clinics, ward-walks, laboratory demonstrations and the like will be held. Johns Hopkins Hospital, and Medical School, under Dr. Alan M. Chesney, Dean, and a specially appointed committee, will place at the disposal of the College all of its facilities and offer a program of great interest. Additional hospitals, such as the Union Memorial Hospital, St. Agnes Hospital, at which Dr. Joseph C. Bloodgood does so much of his work, the Municipal Hospitals, and several of the more private institutions, such as the Howard A. Kelly Hospital, noted particularly for its radium activities, and the Sheppard and Enoch Pratt Hospital, which is one of the most modern dealing with psychiatric problems, and many others will provide programs of clinics.

Hotel headquarters will be at the Lord Baltimore Hotel, while general headquarters, at which the registration of members, commercial exhibits and all general sessions will be held, will be the Alcazar, Cathedral and Madison Streets, Baltimore. Transportation on the Certificate Plan of reduced fares will be available to all physicians and dependent members of their family from all parts of the United States and Canada. A special program of entertainment has been arranged for visiting ladies. The Convocation for the induction of new members, as Masters or Fellows, will be held on Wednesday evening, March 25th, and the Annual Banquet will be held on Thursday evening, March 26th. The Business Meeting, at which reports of administration and elections for the new year will take place, will be held during the forenoon of Thursday, March 26th.

Mr. E. R, Loveland, 133-135 S. 36th Street, Philadelphia, is the Executive Secretary of the College, and it is to him that requests for further information or programs should be addressed.

The American Association for the Study of Goitre: Prize Essay

The American Association for the Study of Goitre again offers an award of three hundred dollars ($300.00) for the best essay based upon original research work on any phase of goitre presented at the annual meeting in Kansas City, Mo., April 7, 8 and 9, 1931. It is hoped this offer will stimulate valuable research work, especially in regard to the basic cause of goitre.

Competing manuscripts must be in the hands of the Corresponding Secretary, J. R. Yung, M.D., Terre Haute, not later than April 1, 1931, to permit the award committee sufficient time to examine all data. Manuscripts arriving after this date will be held for the next year or returned at the author's request.

The first award of the 1930 annual meeting, held in Seattle, was given to Dr. William F. Rienhoff, Jr., of Johns Hopkins University, Baltimore. Drs. O. P. Kimball, of Cleveland, O., E. P. and D. R. McCullagh, Cleveland Clinic Foundation, Cleveland, O., and Robert P. Ball, of the University of Louisville, received honourable mention.

Hospitals are Taxed in California

It will be a surprise to many Canadians to learn that in three states of the neighbouring union, California, Wyoming and New Mexico, non-profit hospitals are subject to taxation. Not only are hospitals in Canada not taxed, but the government gives grants on a patient-day basis, which in the majority of provinces applies to private as well as to public patients. During the past year the hospitals in California made a strenuous effort to have this situation corrected. While in the aggregate the annual revenue to the government at issue was only $325,000, the burden to the paying sick was unduly high. It was ascertained that the increased cost of hospital care to the average patient to meet the hospitals' tax was $2.28. In one hospital the tax per-patient-day was 55 cents, and in another, actually 58 cents. In the long run, of course, this was paid by the private patients and is a system of taxation which is extremely unfair. This proposed amendment was voted upon at the state election some weeks ago. We regret that information received indicates that the amendment was not carried.

The Addition to the New York Polyclinic Medical School and Hospital

The new twelve-story addition to the New York Polyclinic Medical School and Hospital on West 50th Street, constructed during the past year at a cost of more than $1,500,000, was formally opened on December 29, 1930, after a dedication luncheon sponsored by the women's auxiliary of the institution.

The addition will provide ample ward space for teaching and also additional space for clinics. Seven floors will be devoted exclusively to clinics, while four floors are designed for private patients.

The entire tenth floor of the main building has been reconstructed into seven new operating rooms and equipped with the most modern hospital facilities. A lounge and consultation room has been provided for the medical staff.

The addition will increase the capacity of the hospital to about four hundred and fifty patients a day and at the same time permit clinical service to more than six hundred out-patients.

There are more than three hundred and fifty physicians and surgeons on the staff of the institution, and more than thirty thousand student doctors from all parts of the world have taken post-graduate courses in it during the fifty years of its existence.

The Polyclinic was organized in 1881 and its first building was on East 34th Street.

A Lower Death Rate in 1929

The Department of Commerce of the United States announces that 1,386,363 deaths occurred in 1929 in the United States registration area corresponding to a rate of 11.9 per 1,000 population, as compared with 12.1 in 1928. The death rate from all causes per 100,000 population decreased from 1,207.1 in 1928 to 1,192.3 in 1929. This net decrease was almost entirely balanced by increases in influenza (from 45.3 to 55.5), diseases of the heart (208.3 to 210.9), and meningococcus meningitis (2.6 to 4.5). Deaths from these three diseases alone caused 21.2 per cent of all deaths in 1928 and 22.7 per cent in 1929.

Among the epidemic and endemic diseases listed in this summary, seven showed lower rates in 1929 than in 1928, the outstanding reduction being for measles (5.4 to 2.5), which caused less than half as many deaths in 1929 as in 1928. Decreases were shown also for typhoid and paratyphoid fever, diphtheria, acute anterior poliomyelitis, dysentery, lethargic encephalitis, and malaria. Other epidemic and endemic diseases showing increased rates, were whooping cough, scarlet fever, and erysipelas.

Decreases among other important causes were: for pneumonia, all forms, (from 98.2 in 1928 to 91.7 in 1929); nephritis (95.3 to 91.2); congenital malformations and diseases of early infancy, (65.8 to 62.4); tuberculosis, all forms, (79.4 to 76.0), diarrhœa and enteritis, under 2 years (20.7 to 17.9); diabetes mellitus (19.0 to 18.8); cancer (96.1 to 96.0), and pellagra (6.1 to 5.8). Deaths from alcoholism decreased from a rate of 4.1 in 1928 to 3.7 in 1929.

Deaths from accidental and unspecified external causes increased from 79.4 to 80.9. The types of accidents which showed the most noticeable increases were automobile accidents, excluding collisions with railroad trains and street cars (20.8 to 23.3), and accidental

falls (14.1 to 14.6). A slight decrease was shown for deaths from drowning (7.1 to 6.2).

A Rockefeller Gift Accepted in India

The government of India has accepted the offer of the Rockefeller Foundation to build and equip an All-India Institute of Hygiene in Calcutta. Lieutenant Colonel A. D. Stewart has been appointed director-designate, a site is being acquired, and all provisional plans have been made. The institute will afford opportunity for research and teaching in problems of public health with special reference to Indian conditions and will cooperate with the present Calcutta School of Tropical Medicine and the affiliated Pasteur Institute, the Carmichael Hospital for Tropical Diseases, and the Leonard Rogers Laboratories. The latter has a special staff working on leprosy, kala-azar, hookworm, intestinal diseases, and filariasis. The Calcutta School published more than eighty technical papers on tropical problems last year.

Dr. Gregg Succeeds the Late Dr. Pearce in the Rockefeller Foundation

Dr. Alan Gregg has been appointed director for the medical sciences of the Rockefeller Foundation. He will occupy the position vacated by the death on February 16th of Dr. Richard M. Pearce, Jr., in whose work he had for many years closely participated as associate director for the medical sciences. Dr. Gregg has been with the Rockefeller Foundation since 1919. During the last five years, he has been directing Foundation's work in the medical sciences in Europe.

Dr. Whipple and Dr. Minot Receive the "Popular Science" Prize

Dr. George H. Whipple of the University of Rochester and Dr. George R. Minot of the Harvard Medical School are the joint recipients of the *Popular Science Monthly's* first annual award of $10,000 "for the current achievement in science of the greatest benefit to the public." This prize was granted in recognition of their work on pernicious anæmia and its treatment. The awards and gold medals were presented on December 18th at a dinner at the University Club, New York, at which the principal address was made by Dr. Robert A. Millikan.

An English Librarian at Johns Hopkins

A series of lectures was given at the Institute of the History of Medicine, Johns Hopkins University School of Medicine, by Sir D'Arcy Power, England, Honorary librarian of the Royal College of Surgeons. The subjects of the lectures are: "Essentials of Medical Biography," "Medical Bibliography," "The Meals of Our Ancestors," "Aristotle's Masterpiece," "Medical Iconography," and "The Growth of a Hospital."

A Historic Microscope Given to the New York Academy of Medicine

A microscope thought to be nearly 200 years old has been presented to the New York Academy of Medicine by Dr. Warren Coleman. The case bears a brass plate on which is engraved: "This Microscope brought from Holland by Jan Evertson Keteltas in the year 1649 is given by his Descendant Henry Keteltas, Aug. 12th, 1895, to Doctor Warren Coleman as a pleasant remembrance." According to a plate inside the case, the instrument was made by Benjamin Cole, who is known to have entered the business in London in 1751. Authorities believe, therefore, that the microscope given to Dr. Coleman was not the one originally brought to this country in 1649, but one that replaced it about 100 years later.

GENERAL

International Medical Post-graduate Courses in Berlin

In addition to the post-graduate courses for March and April, as announced in our last issue (January, p. 182) the Dozentenvereinigung für Aerztliche Fortbildung zu Berlin announces the following opportunities for the autumn.

Courses in October, 1931:

A course on Internal Medicine.
A course on Thoracic Surgery.
A special course on Urology.
A course on Physical and Dietetic Treatment.

The information bureau of the Kaiserin Friedrich-Haus, Berlin NW 6, Luisenplatz 2-4 gives information on all questions relating to the above.

The Sixth International Congress of Military Medicine

The sixth International Congress of Military Medicine and Pharmacy will be held at The Hague from June 15th to 20th next. The subscription is 10 Dutch florins for members of the congress, and 5 florins for those who accompany them. Specially reduced railway and steamship fares will be available.

Post-graduate Course in Oto-rhino-laryngology, University of Bordeaux

The 8th Annual Post-Graduate Course, Oto-rhino-laryngological Department, University of Bordeaux, France, commences July 27, 1931.

A five weeks' intensive course for American and Canadian physicians will be given in English under the personal guidance of Prof. Georges Portmann.

Plastic, Sinus, Trans-maxillary, Mastoid, Neck and Goitre Surgery; as well as Bronchoscopy, Laryngoscopy, Œsophagoscopy, and Tongue Surgery are the subjects studied.

The course is limited to twelve physicians who act as assistants to Prof. Portmann in this interesting operative course.

For particulars write to Leon Felderman, M.D., 413 Mitten Building, Philadelphia, Pa.

Laveran

On the occasion of the fiftieth anniversary of the discovery of the hæmatozoon of malaria a memorial tablet to A. Laveran was unveiled, on November 6th, in the hall of honour of the Val-de-Grâce Military Hospital, Paris. The ceremony was presided over by Dr. Roux, Director of the Institut Pasteur, and was attended by Mme. Laveran and representatives of the Institut de France, Académie de Médecine, and various learned societies.

Honorary Doctorates

The title of doctor *honoris causa* has recently been conferred by the University of Liège, on Professor Calmette, of the Institut Pasteur, and on Dr. Louis Lapicque, professor of physiology at the Sorbonne.

Dr. Friedrich Stotz of Heilbronn, the inventor of synthetic adrenaline, who recently celebrated his seventieth birthday, has been nominated doctor *honoris causa* by the medical faculty of Marburg University.

Book Reviews

The Pathology of Internal Diseases. Wm. Boyd, M.D., F.R.C.P., Ed., Dipl. Psych., F.R.S.C., Prof. of Pathology, University of Manitoba. 888 pages, 298 illustrations. Price $10.00. Messrs. Lea & Febiger, Philadelphia, 1931.

The purpose of the book is clearly stated in the author's preface, as follows, "These pages are devoted to pathological matters, but the relation of symptoms to lesions concludes the discussion of every subject of major importance." In some ways, indeed, it is an illustrated textbook of internal medicine, written from the point of view, not of diagnosis or of cure, but of the mechanism of disease, its why, and its wherefore." The book is an actual fulfillment of this purpose. One of the most important, indeed, one of the most useful and most creditable, parts of the book deals with the "Relations of symptoms to lesions." The correlation of pathological findings in their broad sense with the clinical aspect of medicine is of inestimable importance for, after all, one of the chief purposes of the study of clinical medicine is to be able to establish just such a correlation. We heartily agree with Dr. Lewellys F. Barker who, in a forword to the book, makes the following statement,—"If this work contained no other sections than the important paragraphs dealing with the correlation of the findings of pathological anatomy and of pathological physiology with the symptoms met with by clinicians, it would be heartily recommended."

At the beginning of most of the chapters there is a brief but very clear resumé of the normal anatomy and physiology of the organ, the diseases of which are to be discussed. Such an arrangement has many advantages. In recalling the normal we should be reminded that after all organs which show diseases are but organs which deviate from the normal, and without the knowledge of the normal, the interpretation of pathological lesions, and through them clinical signs and symptoms, becomes hazardous if not impossible. The very nature of the book makes it impossible to discuss all the diseases that come under the general heading of internal disease, yet the selection of subjects is comprehensive and deals with the most important lesions that are generally classed under the heading of internal disease, as well as a good many of the less important ones.

The references at the end of each chapter will be found very useful and are comprehensive enough for the student and the general reader. The usefulness of the book will be greatly enhanced if one reads it in connection with the author's book on "Surgical Pathology" for the two are, in a sense, complementary.

The many illustrations are well selected, are excellent and come from the author's own collection. This in itself adds a definite personal touch. As but one example of the excellence of the illustrations one might cite those which deal with the microscopical features of tumours of the brain.

The book will be found most useful both to undergraduates and graduates of medicine as an adjunct to their text book or textbooks on clinical medicine and by referring to it a clearer insight will be obtained into the disease processes.

It is refreshing to see here and there quotations from some of the classics of medical literature.

The book is a distinct contribution to medical literature and is a definite credit to Canadian medicine; it should point the way to further comprehensive scientific publications from Canada.

Recent Advances in the Study of Rheumatism. Frederic John Poynton, M.D., F.R.C.P., Physician, University College Hospital, etc., and Bernard Schlesinger, M.A., M.D., M.R.C.P., Physician to the Children's Department, Royal Northern Hospital, etc. 312 pages, 25 illustrations. Price 12/6 net. London, J. & A. Churchill, 1931.

This is the second of the "Recent Advances" series to be devoted to a single disease—if rheumatism can be so considered. The present outlook on rheumatism fully justifies such a volume. There was a time, not so very long ago, when it seemed as if rheumatism was going to be divested of its veil of cloudy obscurities and that we should henceforth know just what we meant when we said rheumatic fever, infectious arthritis, rheumatoid arthritis, and so on. Above all, we were to banish the term "rheumatism" as meaning too much, or, nothing at all. The term "arthritis," too, was to rescue our classification from chaos.

Now, however, we are told that "Rheumatisn of childhood" is probably one of the best terms that has been produced, for that particular form must be distinguished from the more dramatically acute "rheumatic fever" of the adult. As for the more chronic types of rheumatism the difficulties in nomenclature "are at present insuperable." What the poor student is to be taught will depend altogether on his teacher. This book then, serves to bring together the many different views regarding not only the nomenclature but the causation as well. The two of course are very closely related to each other. As long as the cause is so much in dispute as it is at present, so long will the descriptive terms be vague and subject to alteration.

In spite, however, of the many uncertainties that still surround rheumatism there is much ascertained fact to be gathered regarding it. The present volume can be most heartily recommended for the clear and comprehensive manner in which it has assembled this information The references to the literature are particularly full and useful.

Chronic Arthritis and Rheumatoid Affections. Bernard Langdon Wyatt, M.D., F.A.C.P., Director, the Wyatt Clinic, Tucson, Arizona. 166 pages. Wm. Wood & Co., New York, 1930.

The author of this book will be remembered by many of our readers as the sometime medical officer to one of our great industries, who contributed several valuable editorials on industrial medicine to the columns of the *Journal*. For some years past he has been located in southern Arizona, where he has had much experience in dealing with chronic arthritic conditions. This experience has convinced him that the prognosis of these conditions is by no means so unfavourable as is commonly supposed, and that "when early diagnoses and adequate care become the rule rather than the exception, we shall hear less about the 'incurability' of chronic arthritis, and the general practitioner will have materially added to his constantly increasing field of usefulness." He considers that, apart from such special measures as the removal or drainage of foci of infection, the general practitioner should be quite capable of treating chronic arthritis successfully, and that when this condition is recognized as a clinical rather than a hospital disease a great step forward will have been taken.

Much importance is attached to early diagnosis in all forms, and to the prompt adoption of suitable regimen. The importance of abundance of vitamin B in the diet is enphasized, and the whole subject of diet is discussed sanely and without prejudice. Drugs receive comparatively little attention. Vaccine and non-specific protein therapy are each given due consideration. In respect of vaccines it is stated emphatically that the most satisfactory and lasting results are obtained by the use of very small doses which are increased so gradually that both general and local reactions are avoided. The claims for hydrotherapy, colonic lavage, electric currents, radiant heat and the sun treatment are considered, the chief place being given to the natural ultra-violet rays, which, at times, may be advisedly supplemented by artificial rays. The author stipulates that climate must be regarded only as an adjunct to other accepted means of treatment, but he is impressed with the improvement which follows carefully prescribed exposure of the skin surface in an air which is dry and comfortably warmed by the sun.

THREE EIGHTHS OUNCE
EPHEDROSST JELLY
EPHEDRINE HYDROCHLORIDE 1.5%
In a completely water soluble base
"Frosst"
OTHER EPHEDROSST PREPARATIONS INCLUDE
INHALANT SOLUTION TABLETS SYRUP CRYSTALS

A chapter is devoted to orthopædic measures which are of value in the prevention or correction of deformities, and another chapter to the exercises prescribed to maintain or restore tone to the muscular and other systems. Altogether the volume is exceedingly practical and full of the spirit of optimism. The arthritic reader can take fresh courage from it, even though he knows too well that the sun is less generous to other parts than to southern Arizona.

Intestinal Toxæmia Biologically Considered. Anthony Bassler, M.D., F.A.C.P., Consulting Gastroenterologist, St. Vincent's, Peoples' and Jewish Memorial Hospitals, New York City, etc. 433 pages, illustrated. Price $6.00. Philadelphia, F. A. Davis Co.; Toronto, Macmillan Co., 1930.

This book, written by a foremost gastroenterologist is presented as a reasoned opinion of the part which the human intestine plays in disease. The author claims that, in contrast to so many contributions in this field, his views are based upon the experience gained from the bacteriological and clinical work of thirty years. Beginning with the assumption that intestinal toxæmias (the author's term for what he would otherwise call autointoxication) are "definitely clinical conditions and, directly or in a cooperative sense at least, most important conditions to be considered in the proper handling of many of the diseases and conditions in medicine," the early chapters review the controversial aspects of the subject. There is vigorous criticism of the current attempts to correct intestinal disorders by the use of such measures as colonic irrigations, dietetic fads, mineral oil, intestinal antiseptics and the yeast fad. The marshalling of the many remedies in this connection forcibly reminds one that at least something akin to intestinal toxæmia is tacitly assumed, even if the conception is not accepted and the phrase not used.

A recognition of the difficulties involved in this type of work and of the many controversial aspects of the subject must condition any critical comment on a book dealing with this subject. One may say, however, that the present book is an interesting statement of the theory of intestinal toxæmia, and should be read for that reason. The practical and clinical aspects are not so successfully presented and remain vague to the reader. It is a little confusing to be told that the history and physical findings are rarely definite in pointing to presumptive evidence of intestinal toxæmia. A denial of these fundamental categories of clinical medicine leaves one wondering what practical course he is to follow. Such phrases as "biologic diagnosis of an intestinal infection" do not serve to clarify the situation. The central feature in the author's presentation is the identification of the intestinal organisms and the application of that knowledge to bacterial treatments. However, the elaborate technique of stool examination which he sets forth is such that it precludes its use except in a few institutions and under special circumstances. The discussion of treatment may be said to be philosophical rather than practical.

The chief value of this book is its plea for intelligent study of the intestinal factor in human disease and for the abandoning of the "assumption type" of diagnosis and treatment which so widely prevails. It is probably one of the defects of such a plea and of the specialist's viewpoint on a controversial subject that too much is claimed for the entity under discussion.

Practical Treatise on Diseases of the Digestive System, vols. I and II. L. Winfield Kohn, M.D., F.A.C.P., Chief of Gastro-Intestinal Clinic, Lebanon Hospital, New York. Vol. I, 574 pages, 542 en- Price, per set, $12.00. Philadelphia, F. A. Davis; Toronto, Macmillan Co., 1930.

This work attempts to approach the symptom-complex of gastro-intestinal diseases from the standpoint of the medical student and the general practitioner. Physiology is discussed with interpretation of symptoms in relationship to absorption and the function of smooth muscle. The engravings in volume I are particularly good and help the reader to visualize the physiological reactions. Laboratory methods and x-ray investigations are discussed in detail. Almost every condition met with in the alimentary tract is reviewed. Discussion of some of the more common diseases such as duodenal ulcer and cholecystitis are treated very briefly and hardly present to the student a comprehensive study. Therapeutic measures are extensively considered and the therapy indicated in all diseases and their complications. Specimen diets are given and should prove of value as a ready reference. The index is exhaustive and meets all requirements.

The Surgical Dyspepsias. A. J. Walton, M.S., M.B., B.Sc., F.R.C.S., Surgeon, London Hospital, etc. 2nd edition. 720 pages, illustrated. Price 42/- net. London, Edward Arnold & Co., 1930.

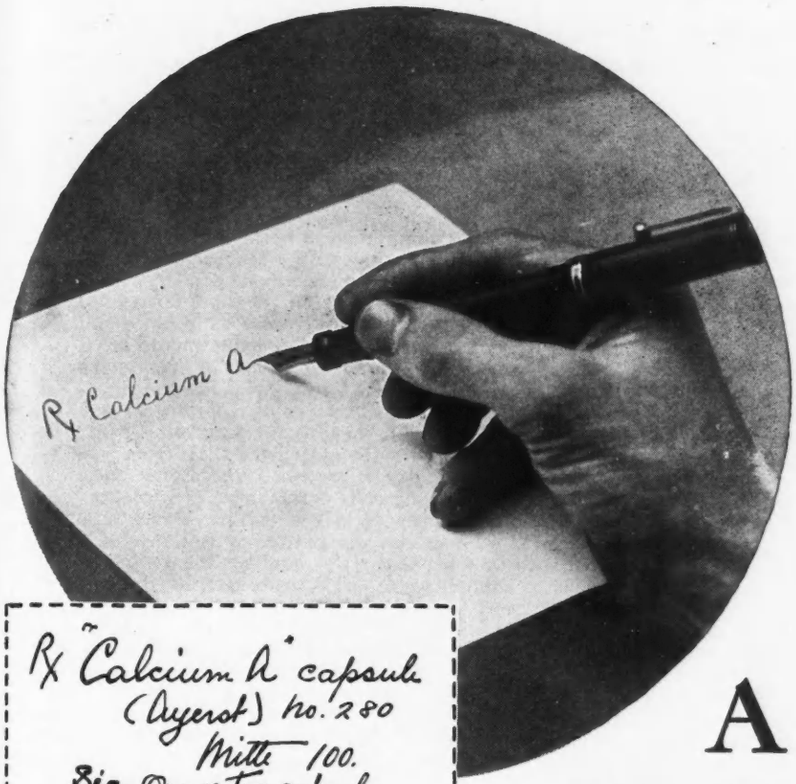
The second edition of this excellent monograph has been considerably enhanced in value by several added features, including "new sections devoted to inflammatory lesions of the stomach other than ulcers, to congenital cysts of the bile ducts and to cholecystography." Some portions have been rewritten almost in their entirety, including the choice of treatment of gastric ulceration, duodenal diverticula, ileus and fistulæ, gastro-jejunal ulceration and the operative technique of gastric lesions. With the exception of chapters on the pathology and symptomatology of visceroptosis and appendix dyspepsia, as well as the treatment of visceroptosis, the whole volume is devoted to the surgery of diseases of the stomach, duodenum, biliary tract and pancreas.

Since the first edition was published in 1923, many advances have been made in upper abdominal surgery and the author has brought this work well in line with current surgical opinion on this important subject. Throroughness is the keynote from cover to cover, and there is a wealth of detail which is most informative. Mr. Walton has drawn on his large personal experience at the London Hospital to illustrate various diseases described in the text, and numerous case records have been included. Though somewhat dogmatic in his views as to surgical treatment, the author shows that good judgment in his opinions which only comes with much experience. In the treatment of chronic duodenal ulcers, he advises medical treatment only if the ulcer is small and relatively recent. It is of interest to note that in a series of 224 of his own cases of gastric carcinoma that 25 or about ten per cent were proved to have arisen from chronic gastric ulcers.

The great value of this textbook is that it comes from the pen of a surgeon with long training and ripe experience in this branch of surgery.

Cancer of the Larynx. Sir StClair Thomson, M.D., F.R.C.P., F.R.C.S., Emeritus Professor of Laryngology in King's College Hospital, and Lionel Colledge, M.B., F.R.C.S., Surgeon to the Throat Department, St. George's Hospital, London. 244 pages, 106 illustrations. Price $7.50. London, Kegan Paul, Trench, Trubner & Co.; Toronto, Macmillan Co. of Canada, 1930.

This book will be welcomed not only by laryngologists but by the general profession as well. So much has been written in recent years regarding this subject, that a review of the subject by some one who has had sufficient experience and is judicially minded is greatly needed. The English laryngologists have long held the leading place in literature of cancer of the larynx. The names of Sir Henry Butlin, Sir Felix Semon and Sir StClair Thomson, are internationally known. It is fitting that the only survivor should have been chosen to present this subject. He is very ably supported by Lionel Colledge. The chapter on pathology is very well written and has numerous illustrations. The chapter dealing with the symptoms and signs together with the principles of treatment forms one of the most valuable parts of this book. The operation of laryngo-fissure is very clearly described, and profusely illustrated. The work is profusely illustrated and is without doubt the best monograph on cancer of the larynx in any language.



℞ "Calcium A" capsule
(Ayerst) No. 280
Mitte 100.
Sig. One or two capsules
three times daily
15 minutes before food

A GOOD FOOD TONIC

Well Worth Prescribing

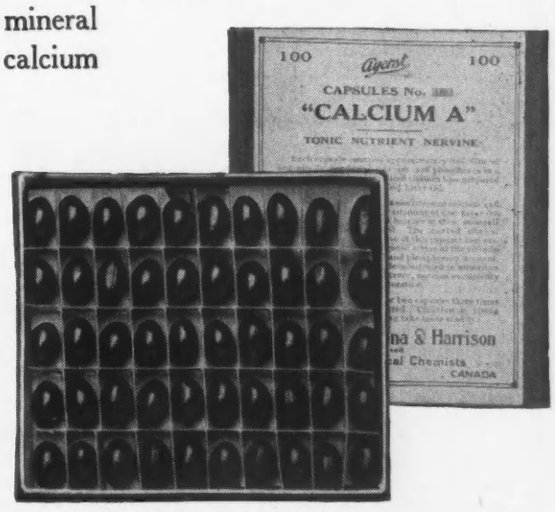
TO increase resistance against seasonal onsets of the common cold and respiratory affections.

■ During pregnancy and lactation as a rational dietary adjunct which improves the systemic background in these conditions of exceptional demand.

■ To assist in recuperation after prolonged illness or post-operatively.

■ As a nutrient nervine in the treatment of neuroses, attributable to disturbance of the mineral tissue bases caused from calcium deficiency.

■ In virtually all cases of undernourishment where Cod Liver Oil therapy may be useful. Each capsule exhibits the complete vitamin content of a teaspoonful of pure Cod Liver Oil.



"Calcium A" capsules are packed in boxes of 100. Like all other Ayerst products they are obtainable from coast to coast in Canada.

A Canadian Product on a sound ethical plane.
Widely accepted by the profession.
Samples and literature on request.

Ayerst, McKenna & Harrison
Limited
Pharmaceutical Chemists
MONTREAL CANADA

Stepping Stones to Surgery (Anatomy applied to Surgery). L. Bathe Rawling, M.M., B.Ch. (Cantab.), F.R.C.S., Surgeon to St. Bartholomew's Hospital. 221 pages. 97 illustrations. Price 12/6. H. K. Lewis & Co. Ltd., London, 1930.

The author of this excellent little work on clinical applied anatomy, is of the opinion, from an extensive experience in the hospital wards, "that there is a gap between Anatomy and Surgery inadequately bridged. Hence the title to the book, 'Stepping-stones,' that lead from one subject to the other."

The plan of the book appeals to the reader. Each type of case dealt with commences with a short clinical history; this is followed by a concise description of the essential anatomy of the part, the whole making a clear cut picture of the injured member or diseased organ in question. A wide range of subjects is covered,—some 31 in all. Practically every branch of surgery has illustrative examples.

This book should prove most helpful to the general surgeon in his every day round and its perusal will amply repay the student interested in this type of work.

Technique and Results of Grafting Skin. H. Kenrick Christie, M.S., F.R.C.S., Hon. Surgeon, the Hospital Wanganui, N.Z. 67 pages, 35 illustrations. Price 7/6 net. London, H. K. Lewis, 1930.

This monograph is an excellent account of the author's experience in the use of skin grafts in the treatment of chronic ulcers and other conditions where loss of tissue makes it necessary to carry out grafting operations.

The chronic ulcer of the leg, notorious for its slow healing and unsatisfactory end results, responded very satisfactorily to thorough excision of the ulcer, base and margins, and the implantation of a Wolff graft. An especial effort has been made to elaborate the Wolff graft which gives perfect results where successful; and trial has shown that very extensive Wolff grafts are capable of succeeding, several over twenty square inches and one forty square inches, resulting in a satisfactory 'take.' An essential factor for success, whatever grafts are used, is to obtain a vascular and healthy bed for them. This means a complete excision of the ulcer.

The Thiersch, and tube-pedicle grafts are briefly described—their method of application and field of usefulness.

A series of case records, illustrated by photographic cuts with summary, brings this very practical little work to an end.

Metabolism of Tumours. Edited by Otto Warburg, Kaiser Wilhelm Institute for Biology, Berlin-Dahlem. Translated from German edition, with accounts of additional recent researches by Frank Dickens, M.A., Ph.D., worker for Medical Research Council, etc. 327 pages, illustrated. Price $12.00. London, Constable & Co.; Toronto, Macmillan Co. of Canada, 1930.

This volume places before us the papers of Warburg and his co-workers on tumour metabolism between 1923 and 1928, with an introductory part on previous investigations dealing with oxidation processes in cells and on methods. The papers have been carefully translated and are presented in an attractive way to English readers. These investigations are, of course, fundamental for our knowledge of the metabolism of tumour cells. Before Warburg's and his collaborators' excursions into this field really nothing was known as regards respiration and glycolytic (fermentation) functions of tumour cells as compared to those of normal orderly growth.

Tumours possess in a high degree the ability of anærobic glycolysis (fermentation) which property they utilize, in the absence of oxygen, to obtain energy. But this property is now also recognized in embryonic and other growing tissues. Characteristic of tumours is, therefore, not the anærobic but the ærobic glycolysis, that is, fermentation under the influence of respiration, or, oxidation in relation to fermentation. In tumours the respiratory function is too small to cover the metabolic balance sheet of the tumour cells; on the other hand, embryonic and other normal, growing, co-ordinated tissues show little or no ærobic glycolysis. Their metabolic balance is covered by their respiration.

It appeared early in these investigations that these metabolic tumour functions stood in relation to the orderliness of growth. Thus irregularity in growth pushes the fermentation phase ahead of respiration. Thus also, the ratio of glycolysis to respiration is for "malignant (disorderly) tumours" three to four times as great as for "benign (orderly) tumours." Of late, experiments have indicated to Warburg that the ærobic glycolysis of tumours results not only from diminished respiration, as it originally appeared, but from disturbances of respiration, and he therefore concludes his preface to the English edition of his collected papers with the statement that, from the standpoint of the physiology of metabolism, "interference with respiration of growing cells is the cause of tumours; if the respiration of a growing cell is disturbed, as a rule the cell dies; if it does not die a tumour cell results." But he also wisely adds that "this is not a theory but a comprehensive summary of all the measurements at present available." It certainly would not be possible to maintain this alone as the "causal principle" of tumour growth, and comparative, more recent, investigations of Neuhaus (published elsewhere) on the metabolism of granulation and tumour tissue in different animals are here of particular interest. Neuhaus has found that granulation tissues (granulomata), in contrast with embryonic tissues, shift the relation of oxidation to glycolysis according to the irregularity of growth just as in tumours, but that marked differences exist in different animal species and even in different animals of the same species. In the order of guinea pig, dog, rabbit and rat, glycolysis becomes correspondingly greater, so that granulation tissue of rabbits approaches the metabolism of "benign tumours," and that of the rat that of "malignant tumours." These differences are specific to the species; within different species the metabolic types of granulation tissue and tumours show no marked fixed distinctions but merge, the one into the other. The transition from orderly (regenerative) to disorderly (certain types of granuloma and tumour) growth shows no fundamental but only quantitative shiftings in metabolism. It is interesting also that metabolic characteristics of granulomata in the animal series quoted above seem to stand in some relation to their proneness to tumour growth. Thus the granuloma of the rat is in a different position as regards transition to tumour from that of the guinea pig. Moreover, according to Warburg's and his co-workers' observations, there is no essential metabolic difference between cancer cells of transplanted rat tumours, human spontaneous tumours, carcinoma and sarcoma cells, the tar cancer and Rous' sarcoma produced by filtrates.

Taking these results into consideration, it would appear that every tissue possesses glycolytic function. But orderly growth and stationary tissue life is satisfied by respiration; only cells with deficient respiration carry on by anoxybiosis and lactic acid appears. The latter, therefore, is an indicator of deficient oxygen supply, or of diminished respiratory function. Both of these may be traced to disorderly, excessive growth, whether of tumour or any other abnormal type (granulomata), that is, to any growth in which the relation of growing cells to their nutrient blood supply is disturbed; cell growth and nutrient supply no longer keep pace. Under such conditions the whole life of these cells becomes abnormally adjusted. The degree of this pathological adjustment depends, it would appear, partly upon the new cell relations to their circulation, partly upon certain specific characters of the species (lower cell respiration, higher glycolytic function).

Though the methods and calculations in these papers may seem to the ordinary medical reader somewhat dixicult to follow, the records of experiments and the conclusions are so clearly and concisely put (and we may add so well translated and edited in their English dress) that we feel that this book should be in the hands of every competent physician who is more than cursorily interested in the cancer problem.

Natural Mineral Water from

VITTEL

GRANDE SOURCE

Indicated in

Gout - - Gravel
High Blood Pressure
Arthritism-Diabetes

Valuable in the arthritic's diet

General Agent for Canada
J. ALFRED OUIMET - Montreal
84, St. Paul St. East

OPPORTUNITY for pathologist in Ontario city 20,000, with large district surrounding. If interested write Box 143, C.M.A.J., 3640 University Street, Montreal.

WANTED — Interne for Protestant Children's Hospital, Ottawa, 60 beds, excellent opportunity for experience in Pædiatrics. Salary $30. a month increasing to $50. if satisfactory, including board, room and laundry. Apply Box 144, C.M.A.J., 3640 University Street, Montreal.

WANTED—Position wanted by an experienced and fully qualified X-Ray and laboratory technician. References furnished. Apply Box 145, C.M.A.J., 3640 University Street, Montreal.

YOUNG WOMAN, Canadian, wants position as Laboratory Technician, had three years war experience in France and four years in 500 bed hospital—is also an R.N. Excellent references. Communicate D. Ullrich, 316 W. Gratist Ave., Mount Clemens, Mich.

FOR SALE.—Giant Eye Magnet; McKenzie Davidsons Localizer for metal; McHardy Perimeter; Oeller's Atlas of Ophthalmology (Vienna), 75 plates; Adams Frost Atlas Fundus Oculi; Spray-Inhaler; 6 bottles with air tank, pump and glass top table; X-Ray table all wood, collapsible, Finsen arc light; Microscope; Surgical table, folding; Eye, ear, nose and throat instruments with case. All good as new at half price. Write Dr. D. S. Sager, Brantford, Ont.

F. & R.'s
GENUINE
GLUTEN FLOUR

Guaranteed to comply in all respects to standard requirements of the U. S. Department of Agriculture.

Manufactured by
THE FARWELL & RHINES CO.
Watertown, N.Y., U.S.A.

"LET ME WORK FOR YOU", says the
PENSION INVESTMENT BOND

Now, while health and strength are yours, while you can spend your money freely, secure in the knowledge that you can soon earn more, set aside the modest payments required for a PENSION INVESTMENT BOND.

When inclination or necessity causes you to retire, your Bond will work for you, supplying you with a regular monthly income which will continue as long as you live.

You may take your choice of alternative methods of settlement when the Bond matures.

Let the Sun Life Man give you fuller particulars.

SUN LIFE ASSURANCE COMPANY OF CANADA
Head Office: Montreal

The Treatment of Schizophrenia. Leland E. Hinsie, M.D., Professor of Clinical Psychiatry, College of Physicians and Surgeons, Columbia University, etc. Price $3.00. Williams & Wilkins Company, Baltimore, 1930.

In this small volume the many forms of treatment which have been adopted in schizophrenia are enumerated. By far the greater part of the book, however, is devoted to psycho-therapeutic methods, and psycho-analysis, as taught by Freud and others, is elaborated. Early recognition of the disease and the immediate institution of treatment are stressed.

Valuable as this contribution is *per se* one feels that more detail as to the approach in specific cases would have increased its usefulness. Certainly a new and optimistic note in the beneficial results from this method is sounded and should be an inspiration to those whose lot it is to treat this form of mental disease. The book will appeal to psychiatrists generally and should be perused by all.

Legal Medicine and Toxicology. Ralph W. Webster, M.D., Ph.D., Professorial Lecturer in Medical Jurisprudence and Toxicology in the University of Chicago. 868 pages, illustrated. Price 79.50. London and Philadelphia, W. B. Saunders Co., Toronto, McAinsh & Co., 1930.

While this book may form a useful addition to the physician's library, it must be remembered that most of the legal questions discussed are illustrated from American cases and deal with American law. The reviewer notices a conflict in the statement made on p. 187, where it states that boys of 13 or 14 have been fathers, and the statement made on pp. 252-3.

In the section on toxicology, most of the usual major poisons are dealt with, and the description of symptoms and discussion of toxic dose and post-mortem findings, is well done. My experience, however, has led me to believe that there are abundant books of this type. What is more needed is a book which is briefer, and which will describe many of the out-of-the-way and unusual sources of poisoning. The physician who encounters a case of poisoning from horse chestnuts, indelible lead pencil and many such oddities has no book in English equivalent to Lewin's book in German. The extent to which this book is a compilation is evident in the illustrations which all seem to be taken from other standard texts.

Nosokomeion. International Quarterly Hospital Review. Edited by W. Alter, 1930. Vol. I, Nos. 1 to 4, pp. 537. Subscription: RM. 12 per annum. Stuttgart, W. Kohlhammer.

A few years ago a small group interested in hospital welfare conceived the idea of an international hospital organization which would enable the hospitals of each country to benefit by the experiences and experiments, social and economic, of workers in other lands. The first fruit of this seedling appeared in June, 1929, when the First International Hospital Congress, attended by delegates of over forty countries, was held at Atlantic City. At that time the publication of an international quarterly hospital review was proposed and this has now been achieved in the publication of *Nosokomeion*.

This first volume contains many valuable contributions. As Dr. René Sand of Paris, Président du Comité International des Hôpitaux, writes, "un vaste inventaire a été institué." Of the twenty-four contributions, 7 are in English, 15 in German and two in French. All contributions, either to *Nosokomeion* or to the biannual Congress must be in one of these three official languages.

A contribution which indicates the practical value of this publication is that of Dr. W. H. Mansholt, of Groningen, Holland, who asks: "What can European and American Hospitals learn from each other?" He finds many contrasts. For instance, the average duration of hospital treatment in America is 12 to 15 days; in Europe, it is about 30 days. As both continents have approximately the same bed ratio (39 per 10,000 population) there must be approximately twice as many patients admitted per bed in America. Why? The Europeans favour "horizontal" or pavilion construction; Americans favour "vertical." Here our newer large hospitals favour small public wards and luxurious private appointments; the laboratories, kitchens, and other services occupy space unthought of in Europe. In Germany but 12 per cent of the general hospitals are under private boards; in the United States, 70 per cent. European hospitals are staffed by relatively small groups of full time doctors; the writer was surprised at the huge part-time and courtesy staffs of the hospitals here. He could not understand (and not without reason) why America had copied the British idea of gratuitous medical attendance for public ward patients. In Europe nurses are given a more practical and less theoretical training than in America, where they are given "a pocket medical training." Dr. Mansholt criticises our magnificent nurses' homes quite severely, considering it "a psychological mistake—or at any rate, a pedagogical one" to provide luxuries greater than the student has had in the past or that society will vouchsafe her in the future. Perhaps there is a touch of the Old World social viewpoint here. He doubts the need, also, of our lavishly furnished private accommodation and our extensive suites of operating rooms. A paper like this is very thought-provoking, especially when the author demonstrates that with a few exceptions the death rate in European countries is as low as in the United States and Canada.

We welcome this hospital review as one which should prove highly instructive and illuminating. It should prove of value to the hospital administrator, the doctor, the nurse and all interested in social and health progress. One regrets that the extent of its usefulness depends to some extent upon the reader's acquaintance with French and German. Europeans, with whom a fair knowledge of the three languages is general, will not find the handicap so great. It is announced that succeeding numbers will contain after each paper brief summaries in the two other languages.

The Chest. L. R. Sante, M.D., F.A.C.R., Professor of Radiology and Director of Department, St. Louis University Medical School, etc. 561 pages, 376 roentgen-ray studies and 163 clinical illustrations. Price $20.00. New York, Paul B. Hoeber, Inc., 1930.

This is probably the most complete exposition of the application of x-rays to the study of diseases of the chest which has yet appeared. It deserves the greatest praise and should be in the hands of everyone who is interested in this field of investigation, either as radiologist or clinician. The book is admirably arranged in three general divisions.

Part I is a general introduction, dealing with essentials of anatomy, the technical considerations necessary to the production of good x-rays, the positioning of patient, tube, etc.; the use of the various opaque oils, etc. Here also is included a useful chapter on the physiology of respiration and an excellent chapter devoted to the principles of interpretation of films of the chest. Part II "deals with the evidences of pathology as they appear at roentgenological examinations, enumerating all conditions affecting each lung structure and showing as far as possible wherein their roentgenological appearance differs in each instance". In this section the author has made very effective use of clinical drawings. Part III "is given over to a detailed consideration of each disease following it through from inception to termination" again well illustrated with numerous x-ray films.

The style is concise and direct with complete absence of padding, the result being a volume which is easy to read and equally profitable for more leisurely study as a work of reference. One cannot close without an expression of praise for the publisher, who is to be complimented on the production of a work in

SERUM TREATMENT
of Pneumonia

UNTIL RECENTLY the use of an unconcentrated serum for Type I infections represented the only serum treatment for pneumonia which had gained general recognition. While this serum did not affect Type II, Type III or Group IV cases, it proved to be a very effective therapeutic agent in Type I cases in which it was used intravenously in large doses.

The obvious difficulties attendant upon the use of large doses of unconcentrated anti-pneumococcus serum have been greatly reduced, Felton and others having suceeded in evolving not only an effective highly concentrated Type I serum but also a corresponding Type II serum. This achievement is of very real significance, since Type I or Type II pneumococci are the causative agents in almost two-thirds of all cases of lobar pneumonia.

Promising results have been obtained from the intravenous use of concentrated anti-pneumococcus sera prepared in the Connaught Laboratories, and supplies of these sera are now being made available in four containers as follows:

5 cc. and 10 cc. Concentrated Anti-Pneumococcus Serum (Type I)
5 cc. and 10 cc. Concentrated Anti-Pneumococcus Serum (Type II)

Should there be occasion to administer serum prior to receipt of a report of the typing of a case, a physician may mix these sera.

Prices and information regarding the use of Type I and Type II concentrated Anti-Pneumococcus Sera will be gladly supplied upon request.

CONNAUGHT LABORATORIES
University of Toronto

TORONTO 5 - CANADA

which the illustrations are so excellent, in that most difficult of fields—the reproduction of x-ray films of the chest and lungs.

Physiological Chemistry. Albert P. Mathews, Ph.D., Carnegie Professor of Biochemistry, The University of Cincinnati. Fifth edition, illustrated. Price, $7.00 net. New York, William Wood & Co., 1930.

The latest edition of Mathews' Physiological Chemistry upholds the standard set by the preceding editions. To those who are not familiar with the book a brief outline of the arrangement and subject matter will probably be of interest. Part one is concerned with the chemistry of protoplasm and constitutes a very complete treatment of the carbohydrates, fats and proteins. Part two is best described by quoting the heading of this section. "The mammalian body considered as a machine. Its growth, maintenance, energy transformations and waste substances." Under this we find animal heat, digestion and absorption, blood, brain, muscle, connective tissue, the endocrine organs, skin, eye, excretions, respiration and the reactions of the organism to infection. Part three is a course in practical physiological chemistry.

As stated in the preface a considerable amount of new material has been added, but one must confess to a feeling that there is at least a slight lack of balance. The amount of space devoted to the endocrine organs seems scarcely commensurate with their importance, and it also seems, to the reviewer at least, that that space might have been used to somewhat better advantage. If the author was concerned about the length of the book, as he appears to have been, then the discussion of the physiology of the pituitary, thyroid and suprarenal might have been condensed and more space devoted to others. The hormones of the gonads are treated in a cursory fashion, and it is suggested that in view of the extent of the physiological treatment, as distinct from the chemical, accorded to other internal secretions a brief discussion of the possible part in the reproductive processes taken by all the hormones known or thought to have something to do with reproduction would add much to the value of this section. Also, in a physiological chemistry one would expect to find methods of obtaining these hormones.

The chapters on the chemistry of the proximate principles of the organism and on digestion are the best parts of the book. When reading them one experiences a greater sense of satisfaction than results from a perusal of the rest. In conclusion it should be said that this book possesses two very desirable qualities: it is conveniently arranged so that a wanted fact can be found without difficulty, and it is easy to read.

The Public's Investment in Hospitals. C. Rufus Rorem, Ph.D., C.P.A., with a foreword by Michael M. Davis, Ph.D. 251 pages; illustrated. Price, $2.50. University of Chicago Press, Chicago, 1930.

The Committee on the Costs of Medical Care is now making a most exhaustive study of the various component factors involved in this complex problem and already several interesting studies have been published. This work on the financial investment in hospitals has been written by Dr. Rorem, a member of the staff of the Committee, and appears to be one of the most authoritative studies yet prepared on this subject.

In this study, Dr. Rorem reviews a side of hospital life which, as a rule, is seldom considered by the doctor. As Dr. Davis points out in his foreword, professional bodies have studied professional organization and standards but have not paid much attention to the influence of such a vast financial investment upon the control, the policies, or the methods of financing of hospitals, and this lack of appreciation of the facts and of the implications of capital investment has been responsible for many of the misunderstandings between medical societies and hospitals.

Not until one considers the capital investment in hospitals, the number of individuals employed, and the annual budget, is it apparent that our hospitals constitute one of our great modern industries. This statistical study is based upon United States data, but is of interest, nevertheless, from a Canadian viewpoint. The cost of construction is rising rapidly and now ranges between $3,000 and $18,000 per patient bed. The total endowment is $437,000,000; while this appears to be a large sum, actually it fully endows but 1.5 per cent of the beds registered in 1928. Most of this sum has been given to university hospitals and over one-half is centralized in four cities.

Many interesting observations are drawn from the data obtained. For instance: present-day construction is in the expansion of existing hospitals rather than in the establishment of new ones; large hospitals are more economical to operate than small ones; a well filled hospital costs but little more to operate than a half-empty one; on the average, patients pay but two-thirds of the current expenses of the hospitals; a reduction in hospital costs will not affect materially the general cost of sickness; the best hospital provision is in the north and middle Atlantic states. Staff doctors now burdened with large public services will be in sympathy with the expressed opinion that professional men should be remunerated for their services for "it is undignified for an organized community to ask any group continually to make gifts of services or commodities to the public good without crediting them explicity with their contributions."

This book contains information of interest and value to the physician, to the administrator or trustee, and to the economist.

A System of Bacteriology in Relation to Medicine. By various authors. Vol. 7. 510 pages, illustrated. Price £1. 1s. 0d. Published by His Majesty's Stationery Office, London, 1930.

This volume is devoted entirely to viruses and virus diseases of which more than one hundred are known to affect animals and plants. The introductory chapter gives an excellent, concise general survey of the viruses and the various phenomena resulting from infection by them.

The more important specific virus diseases are dealt with in detail in succeeding chapters and in the concluding section bacteriophagy and cognate phenomenon are fully discussed. To each chapter is appended references to the more important works on the various subjects.

In keeping with the policy of this System of Bacteriology, the subject matter in Volume VII is concisely, yet comprehensively, presented. One may glean from these comparatively few pages all that is known of this very important branch of bacteriology and its relation to the practice of medicine.

A Text-Book of Gynæcology. Arthur Hale Curtis, M.D., Northwestern University Medical School. 380 pages, 22 illustrations. Price, $5.00. London and Philadelphia: W. B. Saunders Co.; Toronto: McAinsh & Co., 1930.

A "Text-book of Gynæcology", by A. H. Curtis, of Chicago, embodies the experience of a tireless worker in this field and voices opinions that are absolutely sane. The opening section on infective processes is, I believe, the best and a masterpiece. He rightly questions the value of active treatment in acute conditions and stresses the fact that relapses are usually re-infections. His strictures on ovarian transplantation are well taken. In the subsection on post-abortion infections he urges "hands off" the uterus when it has been previously invaded. The reviewer has found menorrhagia more frequent than amenorrhœa in genital tuberculosis.

The second section, devoted to tumours of the uterus, is not as full as it might be. The same can be said also of the next section, tumours of the ovary.

The following section, on displacements and relaxations, ranks in honour with the first section. The

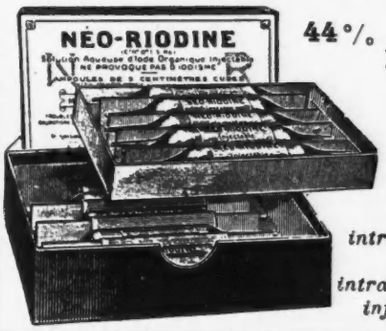
IODINE OR IODIDE MEDICATION

Immediate and intensive action BY **NÉO-RIODINE**

Slow and continuous action BY **RIODINE**

DOES NOT PRODUCE IODISM

Aqueous Solution of organic Iodine for Injections



44 °/₀ Iodine.

For intravenous or intramuscular injections.

Glyceric ether of Ricinoleic acid.

Definite and stable Chemical compound.

$(C_{18}H_{33}O_3)_3 (1H)_2 C_3H_5$

AVERAGE DOSE: 2 to 6 capsules a day.

Also in large boxes containing 50 ampoules 5 c.c. at reduced price, for use of Physicians, Hospitals and Clinics.

Each capsule holding approximately 20 centigrammes (3, 1 grains) of liquid and, therefore, one-half grain of iodine.

LABORATOIRES: P. ASTIER, 45-47 Rue du Docteur Blanche, PARIS
332 BROADWAY, NEW YORK
Sole Agents for Canada: ROUGIER FRERES, 350 Lemoine Street, MONTREAL

Duncan, Flockhart & Co.'s

Vaginal Douche Tablets

IN GLASS CYLINDERS OF 12 TABLETS

No. 1 { ℞ Alum Sulph. .....30 grains
Zinci Sulph. .....30 grains
Potass Permang...2½ grains } In each Tablet.

One Tablet to be dissolved in a pint of hot water for each application. Deodorant and astringent: rapidly soluble in hot water: most convenient form for preparation of a douche for treatment of leucorrhœa and kindred troubles.

No. 2 { ℞ Zinci Sulphocarbolat 30 grains
Alum Sulph ..... 30 grains } In each Tablet.

One Tablet to be dissolved in a pint of hot water for each application. Similar Tablet to the above, being strongly antiseptic and astringent.

No. 3 { ℞ Acid Tannic .....15 grains
Alum Sulph.....30 grains } In each Tablet.

One Tablet to be dissolved in a pint of hot water for each application. Readily soluble in hot water, and form a valuable Astringent Vaginal Douche.

MAY BE ORDERED THROUGH ALL RETAIL DRUGGISTS
SAMPLES ON REQUEST

Duncan, Flockhart & Co.
Edinburgh and London

R. L. Gibson
88 Wellington St. West TORONTO

technique of vaginal operations for genital prolapse is clearly and accurately described. The author, his predecessor, Watkins, along with the late Fothergill, of England, will ever deserve the homage of gynæcologists the world over, in their insistence on vaginal plastics solely, as usually being sufficient, when well done, to cure genital prolapse in all its vagaries. The diagrams at the end of this section are exceptionally clear. The artist deserves praise.

The sections on special diseases and symptom complexes, while also very sketchy, probably contain almost all that is worth while. The chapters, "The gynæcological patient presents herself", and "Operative management and post-operative care", can be read by specialists and general surgeons alike with profit. The author's well-known views on urinary retention, post-operative, are accentuated. The busy gynæcologist will welcome this excellent book.

Physical Diagnosis. Warren P. Elmer, B.S., M.D., Associate professor of Clinical Medicine, Washington University, School of Medicine, and W. D. Rose, M.D., late Associate Professor of Medicine in the University of Arkansas. Sixth edition. 903 pages, illustrated. Price, $11.00. St. Louis: C. V. Mosby Company; Toronto: McAinsh Co., 1930.

This contribution to the literature on the subject of physical diagnosis is a completely revised edition of Dr. Rose's previous edition. The subject is handled in a somewhat different way from what is customary in a book on physical diagnosis. It is divided into two parts. Part 1 covers the clinical anatomy and physiology of the thorax, circulatory system and the abdominal organs. Following this, there are chapters on inspection, palpation, percussion and auscultation. In these latter chapters the author attempts to cover each diagnostic procedure before taking up another, for instance, inspection of the entire body is discussed before palpation is introduced. There are also short chapters on such special diagnostic procedures as radiology and electrocardiography. Part 2 deals entirely with the physical diagnosis relating to diseases of the respiratory and circulatory systems. Following a short discussion on the clinical pathology of each disease, the author takes up the physical signs as revealed by the methods of inspection, palpation, percussion and auscultation followed by a note on diagnosis and differential diagnosis.

With the exception of an occasional error, such as appears on page 101, which states that a child doubles its weight in the first year (instead of by the fifth month), the book is well written, readable and covers the entire subject of physical diagnosis in a very thorough manner. It is, undoubtedly, a good reference book for practitioners and, except for being, possibly, too voluminous, a very good text-book for students.

Text-Book of Medicine. Edited by Russell L. Cecil, M.D., Sc.D., Asst. Professor Clinical Medicine, Cornell University. Second edition. 1,592 pages. Price, $10.00. London and Philadelphia: W. B. Saunders Co.; Toronto: McAinsh & Co., 1930.

The publication of the second edition of this work, three years after its first appearance, indicates its popularity. It is of convenient size for students and for quick reference by practitioners. Although one feels less esteem for a book built up by various contributors, however carefully chosen, than for the product of a single author who carries one's whole confidence, the editor justly claims that the subject is too large for one man's responsibility. A distinct addition to the value of this book, not often found in publications of its concentrated character, is a short list of references appended to each section. Although such references are wisely limited to the more accessible journals and monographs, Canadian readers would feel more certain of the soundness of the text if a larger proportion of British authorities were included.

This edition contains articles on a few subjects not previously sufficiently worked up to a point where they could be used as safe foundation material for medical education. Creeping eruption, snake venom poisoning, pulmonary atelectasis, Oroya fever, agranulocytic angina, have until recently been discussed almost exclusively in current literature. Other diseases which have been described very briefly in the first edition are here enlarged upon; such are tularemia and Brucella abortus infections. Essential hypertension is elaborated out of the old section on arteriosclerosis and the various types of arthritis are given more prominent settings. Under rheumatoid arthritis is given a synopsis of the investigation during the past three years, under the editor's supervision, of the bacteriology of the disease. The bulk of the book, however, contains the same excellent information as the first edition.

BOOKS RECEIVED

Diet and Care of the Surgical Case. Reynold H. Boyd, M.B., Ch.B., F.R.C.S., Formerly Resident at the Royal Northern Hospital, The Hospital for Sick Children, etc. 106 pages. Price 5/- net. London, H. K. Lewis & Co., Ltd., 1930.

The Surgical Clinics of North America. By leading surgeons. Vol. 10, No. 5. October number. Issued serially, every other month. 300 pages, illustrated, $18.00 (six nos.) London and Philadelphia, W. B. Saunders Co.; Toronto, McAinsh & Co., 1930.

The Surgical Clinics of North America. By leading surgeons. Vol. 10, No. 6. December number. Issued serially, every other month. 300 pages, illustrated, $18.00 (six nos.) London and Philadelphia, W. B. Saunders Co.; Toronto, McAinsh & Co., 1930.

Colour and Cancer, An Investigation. C. E. Iredell, M.D., M.R.C.P., Surgeon-in-charge Actino-therapeutic Department, Guy's Hospital, etc. 106 pages. Price 6/- net. H. K. Lewis Co. Ltd., London, 1930.

A-B-C of Child Health. Algernon Wear, C.M.G., M.D., B.S., D.P.H., Chief Medical Officer, Leeds, Education Committee. 80 pages. Price 30c. Bristol, John Wright & Sons; Toronto, Macmillan Co. of Canada, 1930.

NERVE CELL INJURY IN CASES OF HUMAN ELECTROCUTION.—From a study made by Orthello R. Langworthy of two cases of electrocution in man, following contact with electric circuits at high voltages, it is demonstrated that changes occur in a majority of the cells of those medullary centres concerned in respiration. These pathological changes show as dislocations of cell nuclei and swelling of nucleoli, with deep staining of nuclear materials and cytoplasmic loss of granules. When nuclear injury is evident, the cells probably no longer have the potentiality of recovery. Cells are abnormal in the nuclei of the medulla controlling respiration. The suggestion may be made that if the injury of these cells is slight, only a temporary respiratory block occurs; if greater, breathing will not be resumed.—*J. Am. M. Ass.*, 1930, **95**.